INNOVATION IN GOVERNMENT:
THE DIFFUSION OF POLICY AND ORGANIZATIONAL CHANGE

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Rebekah St. Clair

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Innovation in Government:
The Diffusion of Policy and Organizational Change

Approved by:

Dr. Kimberley Isett, Chair
School of Public Policy
Georgia Institute of Technology

Dr. Richard Barke
School of Public Policy
Georgia Institute of Technology

Dr. Gordon Kingsley
School of Public Policy
Georgia Institute of Technology

Dr. Gregory Lewis
School of Policy Studies
Georgia State University

Dr. Hal Rainey
School of Public and International Affairs
University of Georgia

Date Approved: August 2019

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SUMMARY

Beginning in the late nineteenth century Woodrow Wilson (1887) proposed the idea that government can be divided into two broad functions: politics and administration. While the debate remains about the extent to which these functions of government are actually separated, Wilson contributed a critical part of how we think about public administration: that there are in fact different dimensions to government. These different dimensions are no doubt related in varying degrees (Svara, 2014), but where literature has been lacking is in teasing out the complexity of government by trying to understand the different dimensions, specifically how they relate to each other. To better understand these relations, the following dissertation looks at two dimensions of government that are theoretically and practically designed to change to meet the needs of their communities. Specifically, I ask: how is the policy-making function of government related to the administrative/organizational function in multilevel systems of government? Here, I examine the extent to which these two different types of change are driven by the same factors. Due to the interwoven nature of our federalist system, I further examine how these functions relate both over time and at all levels of government, and in two different cases: one where change begins at the federal government level and diffuses downward, and one where change begins at the local level and diffuses upward.

Using both logistic and qualitative comparative analyses (QCAs), I ultimately conclude that change is not just change. Policy and organizational change are largely

driven by different factors; however, how these two dimensions of government differ is highly contingent on both level of government and origin of change.

CHAPTER 1: INTRODUCTION.

Harkening back to the late 1800s, we public administration scholars have thought of government as having two very broad functions: politics and administration. Woodrow Wilson (1887) sparked a debate about the nature of the relationship between politics and administration when he essentially argued that these two functions of government were insulated from each other, where politics is an expression of the will of the state and administration is the execution of that will. This idea became known as the politics-administration dichotomy and whether it exists is still a debate (Demir, 2014). Mostly beginning in the mid-1900s, studies began to show that politics and administration were not very insulated. A trend described and feared by Mosher (1967), studies have shown, that both dimensions of government are in fact wound in the other (e.g. Landsberg, 2007; Pollitt and Bouckaert, 2000). The outcome is an interwoven system where political processes and performance are affected by the norms and values of the administrators (Ballam, 2011; Shafritz, et al., 2004).

The dichotomy debate emphasizes that government has different dimensions to it. Further, the interwoven nature of government shown by the dichotomy studies reflects the complexity of government. Together, this means that we know that the different functions of government are related, but it leaves us with questions as to *how*. The research presented here is centered on thinking about this *how*. In this research, I look at the nature of the interwoven system of government, specifically how the different functions of government relate to each other in instances of change.

Organizational change is a particularly ripe area to study this relation. In terms of the functions of government, policy adoptions and changes in the organizational

structures reflect two different dimensions of government, and are two ways that a government can address an issue. Further, we know that all organizations change. They all undergo, to some extent, an "alteration and transformation of the form so as to survive better in the environment" (Hage, 1980, pg. 262). Decades of study have emphasized that organizations are constantly in motion, responding to internal and external pressures to change (Child and Kiesler, 1981; Hall and Tolbert, 2005). This protean nature of organizations is exacerbated by the fact that organizations do not exist in isolation, but in a web of other organizations. Consequently, fully understanding how and why organizations change requires looking at organizations individually and collectively (Battilana and Casciaro, 2012).

Ultimately, I pose the research question: how is the policy-making function of government related to the organizational/structural function in multilevel systems? Here, I assess the extent to which these two different forms of change are motivated and enabled by the same factors. Specifically, I look at how different levels of government innovate over time in terms of policy adoptions and in terms of changing their organizational activities. Further, because the motivations for change vary depending on origin, I examine how these functions relate in two different scenarios: in a case where change begins at the federal government level and diffuses downward, and where change begins at the local level and diffuses upward. The goal was to better articulate how these functions relate by understanding how each changes, and to assess 1) if these change processes look different overall, 2) if these change processes look different across the levels of government, and 3) if these processes look different over time.

Policy and Organizational Change in Systems. Because organizations exist in populations of other organizations, the complexity of government is exacerbated. Not only can organizations adapt their operations and strategies to match those of other organizations that have been deemed the norm or most effective (e.g. Dimaggio and Powell, 1983), but so also can the values and goals of one organization be adopted by another (e.g. Jun and Weare, 2012). Thus, part of understanding the relationship between these different dimensions of government demands understanding the relationships among organizations, or understanding how the system of organizations functions on the whole.

This interplay of organizations exists horizontally (relationships among organizations operating on a similar level, such as state governments) and vertically across organizations (relationships that exist within a top-down hierarchy). Overall, these organizations exist in a federalist, multilevel system. Multilevel systems refer to interacting authority structures (e.g. Piattoni, 2009), such as the United States federalist structure of government. Here, power and authority are shared between national, state, and local governments, where the different powers and authorities are defined by the U.S. Constitution and each level of government has some degree of autonomy (Riker, 1964). Thus, organizations within a federalist structure exist on different levels of authority, resembling a hierarchy of organizations. Such a structure leads us to presume that changes in these organizations often "emerge from the interaction of multiple centers of authority" (V. Ostrom, 1994, pg. 17). This has two key implications. First, policy and organizational changes can occur anywhere in a system of organizations. Second, organizations in a system of organizations make decisions with access to "diverse

methods of problem solving" that result from having interactions with organizations of varying resources, capabilities, and knowledge. So, organizations make decisions, like whether to adopt a policy, in the context of each other; and the changes made may not only originate from any place within this web of interactions, but may be driven or inhibited by different factors among the different levels (V. Ostrom, 1994). So, the factors driving change at a local level can affect change at a state level (or vice versa) (Boushey, 2012). Thus, the interplay between the policy-making and structural dimensions of government likely varies organization to organization and even across levels of government.

Contributions. This research has multiple contributions. First, we know a lot about policy and structural innovative behaviors of organizations, but not a lot about how they relate, such as what factors make them innovate in terms of policy compared to structural changes. This research begins to better understand the complexities of government by looking at these two dimensions of government, these two avenues of change, to understand more about how government works and how problems are addressed.

Second, I assess the drivers of these different dimensions of government in different contexts. Looking at the different dimensions across levels of government in both top-down and bottom-up scenarios further allows us to realistically understand how government works and innovates, because it enables us to understand not only how policy-making and structural changes relate, but also how these relations vary in different scenarios, offering more context.

In addition to furthering our understanding of the complexity of government, assessing these dimensions within a system of organizations also enables a contribution

to policy and federalism literatures. Knowledge regarding the diffusion of policy adoptions across levels of organizations (e.g. from local to state) is less abundant than diffusion across organizations on the same level (e.g. from state to state). Further, vertical diffusion of policy *adoptions* is significantly less developed than vertical diffusion of policy *implementations*. This, coupled with the changing nature of federalism, with shifting balances of power (V. Ostrom, 1994), will give a deeper understanding into how the different levels work together.

Methods. The policy and organizational dynamic was examined in the context of the U.S. public health system. Here, policy change is operationalized as an adoption of a bill or ordinance, while organizational change is conceptualized as changes in the types of activities performed to address the health issue at stake. This allows for two different types of government innovations to be comparatively studied. To examine these changes in a system of organizations, two different initiatives were selected: one bottom-up initiative (a local policy adoption that diffused upward) and a top-down initiative (a federal policy initiative that diffused downward). The bottom-up case is the trans-fat restrictions and the top-down case is HIV/AIDs prevention. These will be discussed in greater detail below.

In this study I employed two separate methods: a logistic regression assessment of how the different levels of government change over time in regard to policy and organizational changes, and a series of qualitative comparative analyses (QCAs) to identify the patterns of internal and external factors that drive the different types of change for state and local governments. Both organizational and policy change types were studied with regard to an intervention year. The intervention year is defined as the

year that a particular initiative was first established. For example, in the top-down case, the CDC launched its efforts with HIV prevention in 2010, so 2010 is the intervention year in this scenario. Thus, I assessed the policy-making and structural changes that occurred post-intervention for each level of government to determine how they co-occurred (if at all).

In sum, I find that when it comes to public organizations, change is not just change. Policy and organizational change are largely driven by different factors, but crucially, that there are instances in which these enablers of innovation align. Moreover, the nature of how these two different types of innovations differ varies by both level of government and origin of change.

CHAPTER 2: BACKGROUND

The relationship between policy and organizational change was examined in the context of the U.S. public health system. Public health in the U.S. is defined as "what we as a society do collectively to assure the conditions in which people can be healthy" (WHO, 1998). This field is a "particularly good" area in which to study questions of change and federalism because it is "extraordinarily intergovernmental", with health knowing no jurisdictional boundaries (Carol and Weissert, 2008). This makes the complexity of government very visible. Overall, three primary levels of organizations in the U.S. exist to meet public health goals: federal, state, and local public health agencies. Together, these organizations are the backbone of the public health system, with each level having its own responsibilities that are unique to that level; yet the success of improving public health at one level is reliant on the efforts and activities of entities at the other level(s) (Turnock and Atchison, 2002). This structure reflects the federalist nature of our government, where power, authority, and decision-making are not held centrally by one authority, but instead are divided amongst the levels. This has not only successfully limited the powers of the federal government as intended by the Framers (Turnock and Atchison, 2002), but it has also created a structure that is collaborative (CDC, 2013; Salinsky, 2010). Thus, identifying the differences among the roles, responsibilities, and powers of the different public health levels is critical to understanding how they interact with each other in practice (CDC, 2017).

As seen below in their figure, the Centers for Disease Control and Prevention (CDC) (2017) categorizes the essential functions of public health as assurance, policy development, and assessment, where essential functions range from providing care, to

monitoring and investigating, to informing and mobilizing communities. However, these tasks manifest in different ways across the levels.

Figure 1: Public Health Essential Functions

Federal Level. The federal government is responsible for policy development, surveying population needs, supporting health research, providing resources, technical assistance, and finances to other organizations, providing protection from health threats and supporting global health initiatives (Institute of Medicine committee for the Study of the Future of Public Health, 1988). These functions are primarily located within the Department of Health and Human Services (HHS), which divides these responsibilities among its six primary organizational units: (1) CDC (2) the National Institutes of Health; (3) the Food and Drug Administration; (4) the Health Resources and Services Administration; (5) the Alcohol, Drug Abuse, and Mental Health Administration; and (6) the Agency for Toxic Substances and Disease Registry (Institute of Medicine committee for the Study of the Future of Public Health, 1988). The CDC is of primary interest in

this study, as it is the main assessment and epidemiological hub for the country, and, unlike the other units, directly serves both individuals and state and local health departments (Institute of Medicine committee for the Study of the Future of Public Health, 1988). The CDC (2011) states its purpose as:

- "Ensuring all levels of government have the capabilities to provide essential public health services
- Acting when health threats may span more than one state, a region, or the entire nation
- Acting where the solutions may be beyond the jurisdiction of individual states
- Acting to assist the states when they lack the expertise or resources to effectively respond in a public health emergency (e.g., a disaster, bioterrorism, or an emerging disease)
- Facilitating the formulation of public health goals (in collaboration with state and local governments and other relevant stakeholders)."

Overall, federal activities can be categorized in two ways: those that are performed directly by the federal government (e.g. policy-making, resource development, and financing) and those that are contracted out, such as to state and local governments, who conduct the largest portion of the federal government's "health business" (Institute of Medicine committee for the Study of the Future of Public Health, 1988). Thus, the federal government often takes a more supervisory, goal-setting, and assistance role when it comes to public health. Its relationships among the levels of government are illustrated below in Figure 2. The arrows indicate relationships within this system.

State and Local Levels. The nature of state and local public health departments varies considerably across the U.S. Traditionally and legally, states are the primary authorities for health, largely dictating the efforts of their state and local efforts. Federal efforts can be influential, but autonomy of public health decisions begin at the state level (Salinsky, 2010). For this reason, states are considered the "principal" governmental body responsible for public health in the U.S. (Institute of Medicine committee for the Study of the Future of Public Health, 1988). In total there are 55 state health agencies (the 50 states plus the District of Columbia and territories), all conducting a wider range of activities than the federal government. These activities include:

- Collecting and analyzing data
- Carrying out federal mandates
- Conducting inspections
- Setting standards and policies
- Screening for diseases and conditions
- Treating diseases
- Providing technical assistance and training
- Providing laboratory services
- Conducting epidemiology and surveillance activities (CDC, 2013; Institute of Medicine committee for the Study of the Future of Public Health, 1988).

However, these functions are the responsibility of both state and local health departments (LHDs) (CDC, 2013), if local levels are present (Rhode Island and Hawaii, for example, do not have local health departments). Whether the state or local health

departments carry out these activities varies state to state. The variation in state-local relationships can be classified into one of three primary types: completely decentralized (LHDs are led by local governments), mixed (some LHDs are led by the state, while others are led by their local governments), or centralized (all LHDs in the state are parts of the state government) (Salinsky, 2010).

Despite the variation, state health departments typically manage the activities of their LHDs by providing funding, setting standards for performance, collecting data, providing laboratory services, preparedness and response to public health emergencies, regulation of healthcare providers, administration of federal public health programs, and implementing certain programs, like surveillance, (Salinsky, 2010). LHDs are often considered the "front line" of the U.S. public health system, being the primary mechanism for health service delivery (CDC, 2013). The activities of LHDs, depending on their relationship to their state department, can be a result of their own initiative or a delegation of state authority (Institute of Medicine committee for the Study of the Future of Public Health, 1988). Large health departments typically have a much broader range of activities than smaller LHDs, but overall the services provided by LHDs are the most population specific and narrow in scope. These include clinical prevention, medical treatment, screening for diseases, and population-based interventions (Salinsky, 2010).

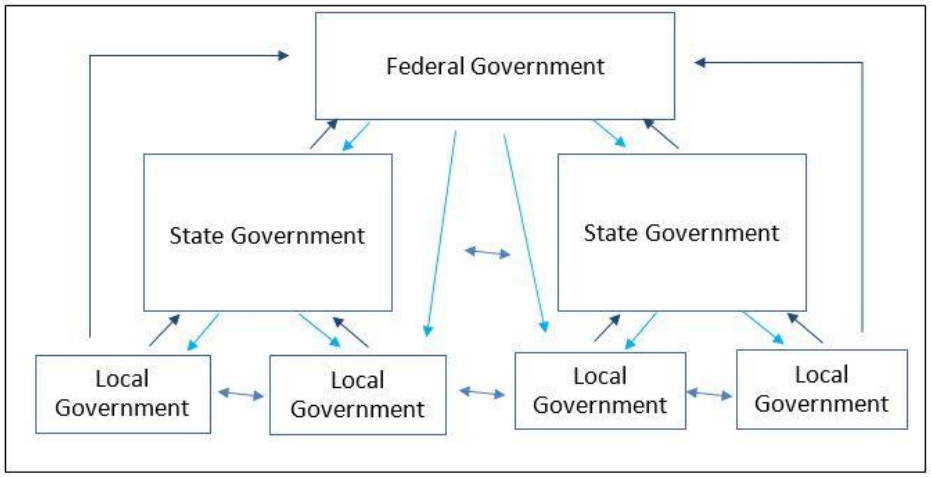

Figure 2. Federalism Relationships

Despite these separated roles, the local, state, and federal governments exist in an interconnected system of relationships, and these roles and functions have evolved over time. The past two decades saw a transformation of public health, where the more "proximal" levels of government (the more local levels of government) as opposed to a national or state government were seen as the most appropriate health organizations to address public health burdens (Fairchild, et al., 2010). Consequently, local governments largely assumed most of the burden of addressing public health issues (Turnock and Atchison, 2002), having more "direct operational" responsibility for many activities, while the broader, collective goal setting and resource allocating functions rest at the higher levels, which seek to act as a "unifying force" across all the local levels (Turnock and Atchison, 2002).

Changing and Innovating in Public Health. Within the public health setting, the complexity of government is prominent with innovations not only being made both in

terms of policy and organizational structural changes, but also in how the relationship between those types of innovations varies across levels of government and over time. Throughout history, how the different levels of government have changed to meet public health needs have shifted, largely tied to changes in both disease type and prevalence. Broadly, public health originated as a practice that was environmental and social in nature, where the major diseases of the time (infectious diseases) were attributed to the unsanitary conditions of the poor and influx of immigrants. At the turn of the twentieth century, the Industrial Revolution brought with it a scientific revolution (Fairchild, et al., 2010). Medicinal and technological advancements soared, and the role of public health began to change from one that focused on the environmental conditions in which people lived, to the issuance of "magic pills" and vaccines. Importantly, these hallmark creations were able to help eradicate many infectious diseases of the times; however, with changes in land use and transportation, coupled with medicinal advancements, a tide of chronic diseases rose to replace infectious diseases as the major killers (Fairchild, et al., 2010; Isett, et al., 2015). Such diseases are not fought by "magic pills" and vaccines, a fact recognized by many public health leaders, who are seeking to change how we do public health once again (Fairchild, et al., 2010). These changes in how we do public health beg the question of how the government has adjusted its strategy to managing public health issues. Historically, government has done this both organizationally and in terms of policy.

Organizational Change. Organizationally, health departments provide certain services for a community (Turnock and Atchison, 2002). Government organizations have largely adjusted their activities and services provided to meet rising health issues. The

responses to these factors are most evident in the activities in which they engage and their funding patterns. For example, during the reign of infectious diseases, public health leaders and departments chiefly focused on environmental solutions to relieving disease burdens, finding ways to affect where people lived to prevent the spread of diseases, including activities such as improving sewage systems and providing cleaner water (Fairchild, et al., 2010). Public health departments changed their health strategies once the scientific revolution reached full swing to meet society's new expectations of behavior for health departments (North, 1990). The primary activities and services of health departments switched to a more individualistic approach revolving around distributing medication and vaccines (Fairchild, et al. 2010). As infectious diseases were replaced by chronic diseases, public health departments faced substantial resistance. Harkening back to the role of health departments of the nineteenth century, beginning about two decades ago, major U.S. cities have recently attempted to address chronic diseases by broadening their scope of activities to include individual lifestyles (Isett, et al., 2015). Yet, they have found resistance in the form of legal battles and public protests over the appropriate purview of health departments (Colgrove, 2011), forcing many health departments to act without the "authority, mandates, and capacity" (Turnock and Atchison, 2002).

Policy-Making. Health departments at all three levels have also responded to changing societal landscapes by adopting policies. The passage of policy to address an issue is important to elected officials as it is a visible government action to address a problem and can thus meet (at least to some degree) a responsibility to constituents (Kernell, et al., 2016; Stone, 2002; Weissert and Scheller, 2008). Whether motivated for

reelection purposes or personal goals, elected officials pursue policy action to accomplish their objectives (Stone, 2002). Despite varying processes for policy-making, each level of government is responsible and capable of passing policies to meet the needs of their jurisdictions. Generally, as the leading diseases traded places over time, so typically did policies to address them. However, how government has responded to public health changes over the years has varied much depending on the level of government (e.g. national compared to state governments).

The federal government's activity in health policy has been described as broad and ambiguous (e.g. Oliver, 2006; Shipan and Volden, 2006; Weissert and Scheller, 2008). Balla (2001) and Kettl (2016) described this as a result of policy "devolution", where social, welfare, and health policy-making responsibility has fallen to more local levels. Oliver (2006) and Weissert and Scheller (2008) argued that the federal government becomes most active in terms of policies primarily when it concerns the nation as a whole, not specific to one locale or subset of states. For example, the federal government takes on the primary role of encouraging and rationing flu shots each year (Barr, 2013).

Also, the national government is also significantly less active in policy-making than more local governments (excluding amendments or edits to existing policies) (Weissert and Scheller, 2008). Research has suggested a few reasons as to why this might be. First, states often have a smaller and less complex political environment than a federal government (Oliver, 2006), making the legislative process more navigable. For example, Weissert and Scheller (2008) found that health policies passed by the federal government were often a result of opportunism. Opportunism can occur when a perceived problem,

solution, and process are brought together in a "window of opportunity", where individuals or organizations advance an idea or innovation (Kingdon, 1984). Such "windows" can arise from shifts in the national mood, anticipation of and reaction to elections, interest group pressure, and the ideological preferences and priorities of key officials (Kingdon, 1984; Polsby, 1984). Therefore, if states and local governments face less complexity (Kernell, et al., 2016; Kettl, 2016), then state and local governments may be more active in passing health policies because the "windows" appear more often.

Second, states and local governments have a more intimate and proximal relationship to their jurisdictions, where needs and solutions are more readily defined and anticipated than at the federal government level (Kettl, 2016; Scheberle, 1997). This is augmented by the fact that certain issues evolve and change over time, requiring the efforts of local governments to recognize and address these issues (Scheberle, 1997). For these reasons, problems have been framed more and more as local issues, thereby demanding local solutions, or at least local government involvement (Scheberle, 1997). Given that recent decades have chronic diseases to mostly blame for our death tolls, affecting lifestyles through policy passage may make more sense on a more local level, where government is more proximal to the problems unique to its jurisdiction (e.g. Colgrove, 2011). Each local or state government is then likely to be able to prioritize its needs on its own political agenda (Kettl, 2016).

The government has adjusted its approach to public health both organizationally and in terms of policy-making. Importantly, how government changes varies based on the level of government. For this study, I am focusing in on two scenarios of change: HIV prevention and trans-fat bans.

Interventions. The interventions for this study are public health initiatives that were either the first of its kind or have been considered the most recently significant effort to improve or advance public health. One top-down and one bottom-up case were selected for analysis. The two different cases described below are examples where significant public health improvements were made. Analysis of these cases lends insight into how the different organizations made that change occur.

Top-Down Change. For the top-down approach, I selected the CDC's Winnable Battles as the initiative starting from the federal level. With this initiative the CDC identified six areas where progress could be made quickly (within a few years), beginning in 2010. These include tobacco; nutrition, physical activity, food safety, and obesity; healthcare associated infections; motor vehicle injuries; teen pregnancy; and HIV. According to the CDC (2016), these priorities have large-scale impacts and have evidence-based support for implementation. From these initiatives, I directed attention to HIV prevention. In 2010, the CDC tasked state and local governments to "implement and support the National HIV/AIDS Strategy; reduce the number of new HIV infections in the US; implement comprehensive prevention with positives and ensure linkage to continuity of care; implement prevention with high-risk negatives; improve data monitoring ad dissemination; and reduce HIV-related disparities" (CDC, 2015). Thus, there are a variety of policies that the jurisdictions could adopt.

I chose HIV for a few reasons. First, these are initiatives that can be found in the data at the local, state, and federal levels. Second, because this research is trying to understand the conditions under which how change diffuses from different directions (top-down or bottom-up), it is important to have success cases. As seen below in Table 1,

these health issues saw significant improvement since the inception of Winnable Battles. This table demonstrates that significant strides have been made to reduce HIV prevalence in the United States. This prompts us to ask certain questions: what was done differently? Who took initiative and what changes were made to meet these CDC targets? Beginning in and extending past 2010, state and local health departments were examined for responding to Winnable Battles. In terms of policy, I examined how many (if any) policies were passed that dealt specifically with HIV after 2010. Organizationally, I examined and tracked if there were any changes made to HIV screening and treatment services provided by the health department at each level of government after 2010.

Table 1: 2015 CDC HIV Progress Report

Winnable Battles Indicator	Baseline	Current Status	Target (2015)
Reduce the number of HIV diagnoses by 25%	48,366 (2008)	39,718 (2014)	32,723
Increase the percent of HIV-infected persons who are aware of their HIV infection status by 11%	80.9% (2009)	87.0% (2013)	90%

Source: CDC (2015)

Bottom-Up Change. Looking at change from local jurisdictions, I selected one initiative from major cities that had nationwide impacts - the trans-fat ban that was kickstarted by Philadelphia and New York City in late 2006/early 2007. Sparking local and national attention, this ban in New York City alone has led to a 6% decline in hospital admissions for heart attacks. In the coming years, a variety of cities and counties across the country would move to pass similar bans (Colgrove, 2011). In 2008, the United States had its first statewide restriction (California), while other states would soon pass less comprehensive restrictions (e.g. Colorado passed restrictions for its public schools). Finally, in 2013, the FDA announced national restrictions on the use of trans-fat to be in full in effect by the end of 2018. Policy changes in this case are trans-fat restrictions that were adopted by the government entity. Organizational/structural changes are those made in how the respective health departments provided cardiovascular disease screening treatments or coronary heart disease treatment services to their jurisdictions. These diseases were selected as the type of service changes a health department could make because trans-fats (partially hydrogenated oils) have long been associated with heart disease, but most more specifically coronary heart disease.

CHAPTER 3: LITERATURE REVIEW.

Changes in organizational structures and policy adoptions represent an innovativeness of government (Borins, 2014). Despite skepticism about whether large government agencies can embrace change, innovation in the public sector persists. Even in the face of obstacles, political backlash, and crises, the public sector continues to innovate (Borins, 2014). The complexity of government is seen in the mix of factors that contribute to its innovativeness, as there are a variety of factors that influence change and there is not one best way to structure a government to ensure innovativeness (Lee and Whitford, 2012).

Barriers and Facilitators of Change and Innovation within Organizations.

There is a deep repository on the internal components of organizations that can facilitate or hinder an organization's ability to innovate, such as by adopting a new policy or making structural changes. To be able to explain how a government innovates in terms of policy or structural changes, it is critical to identify those factors that facilitate innovation, obstruct innovation, and enable the organization to overcome those obstacles (Mohr, 1969).

Institutional Factors. The structure of the organization determines the extent to which the organization adjusts to environmental changes (Hannan and Freeman, 1984). For this reason, innovativeness in organizations has been described as being mostly influenced by structural determinants (Greenhalgh, et al., 2004). Organizations are by nature conservative, as their very structures present systemic obstacles to change (Kaufman, 1971). The relevant aspects of the organization's structure include its size (Hannan and

Freeman, 1984; Kimberly and Evanisko, 1981), complexity (Hannan and Freeman, 1984), specialization (Rosengren, 1967), degree of centralization (Lawrence and Lorsch, 1967), and routines (Aggarwal, et al., 2017). Each of these concepts affects how organizations function, and thus how they are able to adapt to their environment, innovate, and respond to environmental changes.

Structure: Size, Complexity, Specialization, and Routinization. The effects of size on an organization's performance and ability to adjust to change is a complex relationship. As such, the existing research on the connection between size and organizational performance or change is mixed. This is largely to a result of two factors. First, the effect of size on organizations is contingent on other factors that more directly affect performance (Hall and Tolbert, 2005). For example, an organization's size can contribute to its resource capacity, where larger organizations tend to have more resources and are therefore more likely to enter into new markets (Haveman, 1993) and have more highly developed internal labor markets (Van Buren, 1992). On the other hand, if size is not managed appropriately, the large size of the organization may cause it to be more bureaucratic, inhibiting market involvement (Haveman, 1993) and adding to its complexity (Van Buren, 1992).

Second, Kimberley (1976) noted that size can be measured in a number of different ways, and these different measures have not always had consistent findings regarding their effects on organizations (Hall and Tolbert, 2005). Size is, however, most commonly conceptualized in two ways: the size of the jurisdiction served (e.g. Turnock, et al., 1974; Nelson and Svara, 2011) and the size of the organization's workforce (e.g. Damanpour, 1992; Lee and Whitford, 2012). Size as a measure of jurisdiction size has

been found to be one of the most consistent predictors of performance (Mays, et al., 2006). Though the relationship may peak after a certain population size (Mays, et al., 2006; Turnock, et al., 1998), organizations having larger jurisdictions tend to outperform smaller jurisdictions, likely due to a higher amount of available resources that are able to be contributed to a particular task (Mays, et al., 2006) and to the technical efficiencies gained through economies of scale and scope (Oakerson, 1999).

Classic literature, such as that of Hannan and Freeman (1984) and Kimberly (1976), suggests that the benefits of having a larger workforce within an organization are due to the increased capacity of the organization to perform, having larger margins of error to withstand environmental disturbances and shocks (Hannan and Freeman, 1984). Kimberly (1976) additionally claims that the larger the organization in terms of employees, the greater the capacity of the organization to conduct more activities and have a wide variety of personnel, which results in a workforce that has an expanded knowledge and skill base (Kimberly and Evanisko, 1981). Thus, perhaps the mixed findings regarding size are a result of the effects of size on other structural variables (Hall and Tolbert, 2005).

Complexity. Research has also shown that increasing the size of an organization increases its complexity. Complexity is commonly defined as the extent to which the organization is professionalized and diversified in terms of its occupations (Hage and Aiken, 1968). For a few key reasons, complexity has been found to be negatively related to change in organizations. First, more complex organizations tend to be the larger organizations, which tend to have large spans of control (Blau, 1968, 1973). Having a smaller span of control is important as it enables an organization to be more manageable. Here, the chain

of command and decision-making authority are clear (Barnard, 1938), and there are transparent lines of information, resources, and communication flows across the hierarchy (Hannan and Freeman, 1984). Second, according to Hannan and Freeman (1984), low complexity enables the organization to deal with both change and external shocks more easily because one "unit can change its structure without requiring adjustment by the other units" (pg. 162), thereby increasing the speed of response to change and external threats (Greenwood and Hinings, 1996).

In a federalist system, the interdependency of governments adds to the complexity (Agranoff and McGuire, 2001). The interplay extends both horizontally and vertically, adding both to the number of connections one single entity has, as well as the responsibility or duty that comes with the relationship (e.g. providing funding to a local government) (Agranoff and McGuire, 2001). This increases the scope of activities and duties required of an organization, which leads to a need for more coordination and control (Alter and Hage, 1993). Further, for public organizations, as complexity increases, so too does their likelihood of linking with nongovernmental entities, such as nonprofits (Stoker and Mossberger, 1994).

Specialization. One mechanism of dealing with complexity is the extent to which the organization is specialized, or the extent to which the organization is able to handle a wide variety of tasks or services (Dooley, 1997; Lawrence and Lorsch, 1967; Rosengren, 1967). Like size, the effects of specialization on organizational functions and outcomes remains largely mixed and multifaceted. Related to innovation, Kimberly and Evanisko (1981) found that the more specialized the organization (defined as number of specialties in the organization), the higher its rates of innovation. More recently, Feldman and

Audretsch (1998) claimed that while this may be true, specialization had a weaker effect on innovation than did the mere diversity of "complementary" activities within and across firms.

Mixed findings are also found with regard to specialization and its effect on managing uncertainty. For example, Mays, et al. (2010) point to an advantage in only providing a limited number of services – that efforts and resources are highly concentrated, thus enabling the organization to better address resource dependencies in their jurisdictions. However, providing a wider variety of services has been shown to enable organizations to adjust to environmental variabilities and uncertainties (Kastelic, 1974; Perrow, 1970; Rosengren, 1970). This is likely due to economies of scope (Mukherjee, Santerre, and Zhang, 2010) and the fact that having a broader scope enables the organization to appeal to and develop relationships with more actors in the environment (Kastelic, 1974). Aligning with Thomson (1967), having a greater number of relationships with other actors and organizations in the environment can better the ability of the organization to anticipate environmental changes (Kastelic, 1974), and therefore respond more efficiently.

However, as is the case with centralization, the effects of specialization on organizational performance is mediated by its environment (Carroll, 1985; Hannan and Freeman, 1983). Aligning with the work of Mukherjee, et al. (2012), the extent that an organization "ought" to be specialized is at least partially dictated by the environment in which it exists. Organizationally, this could mean that the services offered by a health department are those that address a need in the community served.

Routines. Finally, the concept of routines has been increasingly included as a key variable affecting organizational performance, adaptation, and capabilities (Aggarwal, Posen, and Workiewic, 2017; Winter, 2003). According to Nelson and Winter (1982), routines are the "continuity in the behavioral patterns" (pg. 96), having little variability (Perrow, 1970), and potentially reflecting leadership efforts at coordinating individuals toward a goal or a bottom-up process of learning (Cohen and Bacdayan, 1994; Miner, Ciuchta, and Gong, 2008; Nelson and Winter, 1982). Routines are commonly discussed regarding organizational performance and change in that one of the easiest ways to change is through adopting new routines that have been identified as legitimate by other organizations (Frumkin and Galaskiewicz, 2004). Yet, routines are often seen as inhibitors to organizational change (Hannan and Freeman, 1984), as they are tied to the beliefs of individuals; and as ACF scholars have illustrated (e.g. Sabatier and Jenkins-Smith, 1993), these habits and beliefs are difficult to change, requiring more discontinuous, non-incremental change to force a reassessment of habits and beliefs.

Authority and Power Relations. Another set of institutional factors that affect innovation is how authority and decision making are distributed among members (Damanpour and Schneider, 2006; Lawrence and Lorsch, 1967; Scott and Mitchell, 1976). Traditionally, decision making authority takes place along a hierarchy, with authority increasing further up the hierarchy (Weber, 1946). Per Knott and Miller (1987), government hierarchies typically concentrate most of their power in the offices of elected officials, with authority distributed among members of the office (e.g. a city council or state executive board). However, organizations will vary how they distribute authority, and this variation affects

receptivity to change. How authority and decision making are distributed can be captured by understanding the extent to which an organization is centralized.

Centralization. The effect of centralization on an organization's innovativeness has been found to have mixed effects on its ability to change and innovate. Some research has shown that the greater the extent to which the organization is centralized, the lower the rates of innovation adoption (Damanpour, 1991). However, earlier work by Lawrence and Lorsch (1967) suggests that this is true for the number of proposals of innovations, but not necessarily for innovation adoptions. It is evident that the relationship between centralization and performance or innovativeness is multifaceted, being reliant on the environment in which the organization exists (Downs, 1967; Udy, 1965). Research has also shown that organizations in large urban areas with great geographic dispersion and diverse activities can struggle to operate effectively (Knott and Miller, 1987; Lawrence and Lorsch, 1967).

For health departments in particular, Mukherjee, et al. (2010) found that organizations in urban environments provided services more efficiently when the organization was more decentralized. This aligns with classic works in organization theory that argue whether an organization performed better under centralized or decentralized structures was dependent on the stability of the external environment (Lawrence and Lorsch, 1967) and complexity of the organization (Udy, 1965). More complex and differentiated organizations, due to the need for regulating internal relationships and managing factions, have a greater need for routinization and standardization (Udy, 1965). Thus, unstable environments tend to be more conducive to decentralized structures, because rapidly changing external environments necessitate a

higher level of interaction with the organization's members, requiring the organization to rely on more informal processes and structures to manage such interactions (Downs, 1967). This can hinder an organization's ability to innovate (Kastelic, 1967) and implies that centralized structures, without informal, horizontal communication flows will have both coordination and knowledge sharing difficulties (Tsai, 2002). According to Nohria and Gulati (1996), these difficulties that come from centralized structures are unlikely to provide the organization with enough slack to be innovative, or are the result of the inability of centralized structures to respond most appropriately to specific needs without affecting other units too extensively (Hannan and Freeman, 1984).

Resources. The resources that an organization has determine its capability to act (Mays, et al., 2006) and not having the appropriate resources presents a major obstacle for organizational change (Gersick, 1991). The most basic resources to an organization are its personnel and funding sources (Hall and Tolbert, 2005; Mays, 2006). Regarding employees, the findings have not been consistent. Organizations with greater numbers of FTEs have been shown to be less effective than those organizations with a smaller FTE workforce (Lee and Whitford, 2012), and specific to health, are more likely to struggle to perform basic health functions (Mays, et al., 2006) and have lower rates of innovation (Damanpour, 1992). Blau (1970) suggests that such difficulties are a product of communication and coordination difficulties that arise with a larger number of employees to organize. Conversely, organizations with larger FTEs have been found to not only be more innovative (Kimberly and Evanisko, 1981), but also to have stronger financial capabilities (Judge, 1994) and more open attitudes toward innovation (Damanpour and Schneider, 2009). So, the effect of FTE resources is contingent on other factors.

In terms of funding, both the locus of funding and financial investments matter for organizational performance and innovative behavior. Financial resources are one of the more robust predictors of organizational performance (Gordon, Gorzoff, and Richards, 1997; Lee and Whitford, 2012; Provan and Milward, 1995), with slack resources often encouraging more innovative behavior (Nohria and Ghulati, 1996). However, the influence of funding is not uniform. Regarding locus of funding, organizations tend to be more sensitive to changes in funding from more local sources than higher levels of funding, such as the federal government (Mukherjee, Santerre, and Zhang, 2010). This is likely due to more local sources of funding allowing for more flexibility in how the funding is used. Regarding financial investments, an organization's expenditures are also relevant for its capacity in being able to function and adapt to changes in the environment. An organization can more easily adopt and adapt to change when it has already invested resources and effort in that particular issue, likely already having established a niche, authority, and knowledge on the given issue (Shipan and Volden, 2006).

Given that government has different dimensions to it, and there are a variety of factors that enable innovation, I ask the following research questions (RQ):

RQ 1: Will structural components will matter more for organizational change than policy change?

RQ 1a: Will organizational change, more than policy change, be driven by highly specialized organizations?

RQ 1b: Will fs/QCA patterns will consistently include decentralized organizations as a contributing factor to change?

RQ 1c: Will those jurisdictions with existing efforts in the health issue in question be more likely to adopt a relevant policy and organizational change post intervention?

RQ 1d: Will policy and organizational change both be more likely in less centralized vertical relationships?

RQ 1e: Will policy and organizational change both be more dependent on large amounts of resources (FTEs)?

RQ 2: Will external components, like having a need for change, matter more for policy change than organizational change?

Change in a Multilevel System.

As stated above, organizations do not exist in isolation. Particularly in a federalist system, the change and adoption decisions of organizations is often contingent on the decisions of other organizations. Therefore, it is important to at least briefly describe how organizations influence each other's decisions in order to better understand and contextualize any innovative behavior (Battilana and Casciaro, 2012). How organizations affect adoption decisions is captured by diffusion, isomorphism, and federalism literatures.

Horizontal Mechanisms of Change. For decades, scholars have noted a diffusion of ideas across organizations (e.g. DiMaggio and Powell, 1983; Shipan and Volden 2008). Rogers (1983) defined diffusion as the "process by which an innovation is communicated

through certain channels over time among the members of a social system (pg. 5). The "normative" starting point is the idea that autonomous entities work as policy laboratories in which new ideas are developed and spread across the country (Gilardi and Fuglister, 2008), thereby permitting the spread of best practices (Fuglister, 2011).

Diffusion and Isomorphism Mechanisms. Building from the observation of Walker (1969) that some states tend to be leaders in innovation adoptions, Berry and Berry (1990) identified five mechanisms of diffusion that drive states to innovate: coercion, normative, mimesis, learning, and competition. Here, scholars have largely built on the seminal works of DiMaggio and Powell (1983, 1991), who identified three different factors that drive organizations to become more isomorphic over time: coercive, mimetic, and normative pressures.

In situations of coercion, organizations may adopt a policy due to pressure from other organizations or actors who either control critical resources (Bridges and Villemez, 1991) or have authority over the organization (Provan, 1987). Here, rules for conforming may be set with either rewards or sanctions to incentivize certain actions (Fligstein, 1985), such as through grants or financial assistance (Derthick, 1970). This is different from an alternative normative pressure, where organizations may also adopt a policy when certain adoptions become the norm (Greenwood, Suddaby, & Hinings, 2002). This is especially relevant for public organizations (Frumkin and Galaskiewicz, 2004; Jun and Weare, 2012), who rely on being politically legitimate in the eyes of their constituents and fellow organizations (DiMaggio and Powell 1983; Frumkin and Galaskiewicz 2004; Tolbert and Zucker 1983). Still, an organization may also innovate to mimic other organizations (Berry and Berry, 1990) or learn what ideas to adopt on the basis of

successful and failed innovations of others (DiMaggio and Powell, 1983; Volden, 2016; Volden and Shipan, 2008).

Given that a variety of factors in a federalist system affect innovation adoption decisions, I ask:

RQ 3: Will policy and organizational changes be driven by different motivations to change/innovate?

Diffusion over Time. Recall that Rogers (1983) defined diffusion as "the process by which an innovation is communicated through certain channels *over time* among the members of a social system" (pg. 5, emphasis mine). According to Berry and Berry (2014), the mechanisms described above (learning, coercion, normative pressures, mimesis, and competition) do not have uniform effects over time, where the rate of diffusion varies. For example, the onset of an innovation is likely to have few adopters, but a significant increase in adopters as the results of the adoption are realized by early adopters. Eventually, the rate of adoptions slows, primarily leaving only late adopters to innovate. The key assumption is that because these entities interact with each other, as the number of adopters increases, so too does the probability of adoptions for other entities (Berry and Berry, 2014). However, depending on their status quo and timing of adoption, leading and "lagging" organizations face different motivations for adopting a new policy at different points in time (Kennedy and Fiss, 2009; Tolbert and Zucker, 1983).

Given that the effects of factors that influence innovation adoption are not uniform over time, I ask:

RQ 4: Will the factors that drive adoption for policy and organizational change vary over time?

Vertical Mechanisms of Policy Change. The vast majority of this literature on how policy adoptions diffuse is among horizontal relations of organizations, such as one state government influencing another state government. However, we do know that there exists another relationship among organizations – a vertical, hierarchical relationship among organizations across different levels of government.[1] Federalism brings with it a natural tendency toward change due to the evolving and sometimes dependent relationships among organizations in the different levels (Baumgartner and Jones, 1993; Scheberle, 1997). Thus, changes in one level of an organization would expectedly bring about change in other levels. Literature has pointed to two vertical change adoption diffusion mechanisms: change via bottom-up and top-down scenarios.

Bottom-Up Change. The literature provides both explicit and implicit reasons for why bottom-up innovation diffusion can and does occur. These include the structure of the U.S. federalist system, local political agendas and values, and local fiscal concerns. Regarding structure, the very design of the federalist structure has bottom up tendencies (Balla, 2001; Kettl, 2016; and Sugiyama, 2011). As discussed by Sugiyama (2011), such tendencies affect how citizens interact with their government, as a decentralized structure

[1] Though we have recognitions of such vertical diffusion effects (e.g. Kollman, Miller, and Page, 1998; Welch and Thompson, 1980), this type of diffusion is much less developed in terms of theory. Few studies explicitly examine the vertical diffusion of decision *adoptions*. Importantly, top-down and bottom-up diffusion theories have been formed, but these mostly exist within the policy implementation literature (e.g. Sabatier and Mazmanian, 1980). Because adoption is distinct from implementation, implementation theories will thus be intentionally excluded from this discussion.

allows for a competitive policy environment where "citizens have learned to make demands for their social and economic rights".

Balla (2001) and Kettl (2016) refer to the concept of "devolution", where lower levels of government are given more leeway and opportunity to develop and implement innovative solutions to problems. Kettl (2016) explicitly argues that this is because more of the work of the federal government is being carried out by local entities. Baumgartner and Jones (1993) add that with recent national financial uncertainty, the federal government is also less willing to "assume the burden for problems" (pg. 219), leaving much of the work for state and local governments. Here, local or state governments may serve as experiments for the federal government (Mossberger 1999; Weissert and Scheller 2008), where the success or failures of lower levels provide learning opportunities for a higher level of government. So, being "laboratories for democracy" for the federal government (Brandeis, 1932), the federalist structure can be a "marketplace of ideas" (Oates, 1999).

With respect to political agendas and values, Gamkhar and Pickerill (2012) argue that local governments may just simply take the lead (Kettl, 2016; Gamkhar and Pickerill, 2012), being incentivized by the federal government (Kettl, 2016; Kollman, Miller, and Page, 1998; Welch and Thompson, 1980), or, in being concerned about "federal debt, partisan politics, and legislative gridlock", local governments do not rely on federal efforts to impact their communities (Gamkhar and Pickerill, 2012). Also, many local or state efforts can rise in opposition to federal initiatives (Engel, 2006; Gamkhar and Pickerill, 2012; Nicholson-Crotty, 2012; Reich and Barth, 2012).

Adoption decisions in a bottom-up context, then, are primarily based on two factors: learning (Brandeis, 1932; Shipan and Volden, 2006), if the issue was already on the legislative agenda (Shipan and Volden, 2006), and collectivity of action both informing higher level governments of salient issues and pressuring those governments to act (Fisher, 2012; V. Ostrom, 1994).

Top-Down Change. As with bottom-up diffusion, there are multiple reasons to expect a top-down change across levels. First, and perhaps most obviously, higher levels have formal and informal authority to mandate certain actions or incentivize state and local governments to adopt certain policies (Clark and Whitford, 2011; Gramkhar and Pickerill, 2012; Siguyama, 2011). Second, Vincent Ostrom (1994) argues that when local jurisdictions are unable to mobilize the appropriate resources, higher levels of government may be more capable of providing a solution. Third, higher levels of government may also be involved when local efforts become engrossed in conflict or legal disputes (e.g. Colgrove, 2011). Fourth, the attention of the federal government to an issue can stimulate top-down diffusion (Baumgartner and Jones, 2009; Boushey, 2012; Clouser, McCann, Shipan, and Volden, 2015) by focusing attention on issues that are most relevant (Boushey, 2012), therefore guiding the agendas of local politicians and giving entrepreneurs an opportunity to influence agenda setting (Mintrom 1997).

From this existing research, I ask:

RQ 5: Will the factors that drive policy and organizational change vary based on diffusion direction?

RQ 5a: Will the fs/QCA patterns regarding policy change will be stronger for top-down change (patterns with higher unique coverages), while patterns regarding organizational change be stronger for bottom-up change (patterns with higher unique coverages)?

Further, because the levels of government perform different tasks with regard to health, I finally ask:

RQ 6: Will level of government be matter for whether the change is a policy or organizational change?

RQ 6a: Will local level governments be more likely to make organizational changes, while state governments are more likely to make policy changes?

RQ 6b: Will fs/QCA patterns regarding policy change be stronger for states (patterns with higher unique coverages), while fs/QCA patterns for administration services change be stronger (patterns with higher unique coverages) for local governments?

CHAPTER 4: METHODOLOGY.

The purpose of this research is to understand how public policy changes relate to organizational changes in multilevel systems, looking specifically at how (if at all) organizational change processes are similar or different than policy change processes. As stated above, government is complex and there is not one best way to structure (Lee and Whitford, 2012). So, to best capture the complexity of government and to tease out when the government innovates in terms of policy as opposed to organizationally, the methodology for this research was selected in order to account for the nuance and context-specific nature of change. The structure of the methodology consists of two main sections: Top-Down and Bottom-Up cases. Within each of these scenarios, the relationship between the policymaking and structural dimensions of government is examined using two methods. The first employs a logistic regression technique that assesses the processes of policy and organizational change over time and across different levels of government. The second addresses the question of "under what conditions does change occur". Using qualitative comparative analysis (QCA), this analytical component assesses if the conditions under which change occurred varied for top-down and bottom-up change. This allows for more nuance into the relationships identified by the logits by enabling us to find the different patterns in how the groups of variables relate to each other. The analytical outline is shown below in Figure 3 and described in the subsections below. Because the two analyses use the same data and variables, I first present information on data collecting procedures and subsequent coding. I follow this up with discussions on the logit and QCA analyses.

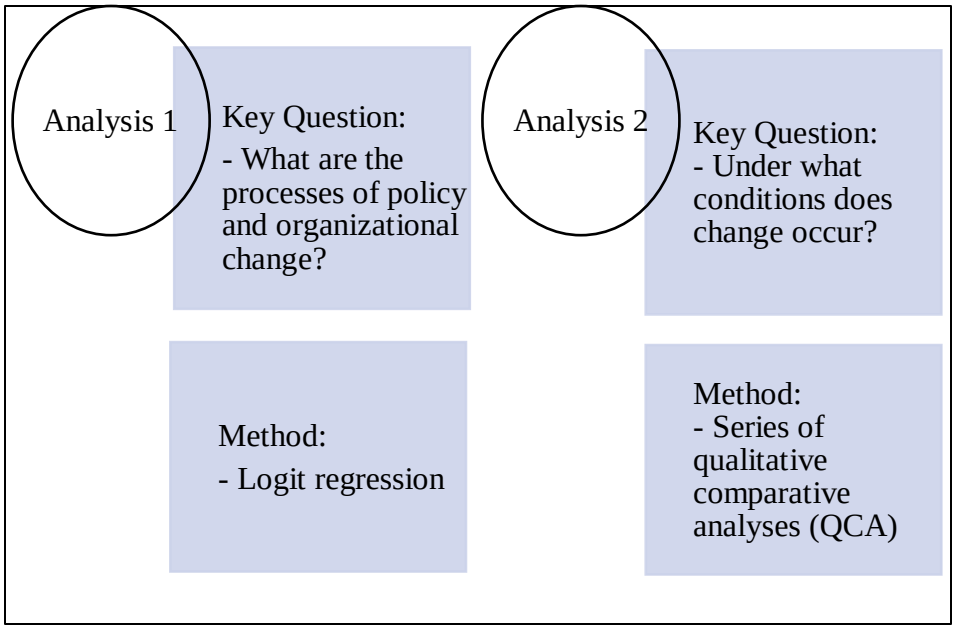

Figure 3: Analysis Outline.

Data Sources and Collection.

Within each top-down and bottom-up case study, the two different analyses for understanding the different dimensions of government use the same data. There are three units of analysis for this study: federal, state, and local health departments. For these three levels, both policymaking and organizational structure data were collected. For policymaking, data was manually collected from each government's website. For each entity, I pulled all relevant ordinances that dealt with the health issue at hand that had passed through the legislative body. For states, this body was the legislative branch of the state government. For cities and counties, this body was the city/county council. In a few cases, the board of health (or equivalent group) had authority to pass laws for the jurisdiction (e.g. New York City), so policies were collected from these bodies, as well.

In multilevel systems, policy innovations can be the result of different types of relationships among organizations (Scheberle, 1997), though here, my interest is in voluntary compliance, where the adoption of policies or a change in structure is not mandated by another organization. On a local level, because jurisdictions can be governed by a city, county, or both, I made an assumption regarding the policies governing an area: if a jurisdiction was covered by the effects of either a county or major city in the county, then the other, likely being fully or mostly covered by the other's ruling, has less incentive to pass a similar policy. Thus, if the organization in the dataset was a city health department who had not passed a certain health policy, but the county in which the city existed had passed the health policy, then I considered that city to have "passed" a health policy because that jurisdiction was already covered (or largely covered). I conducted a sensitivity analysis where I removed this assumption and then performed the logit analyses. The results largely held. Appendix A shows the results of this analysis.

I created specific criteria for what was deemed a relevant policy. For the top-down case of HIV prevention, HIV policies were considered those that met two criteria: 1) the policy dealt only with HIV, targeting the disease specifically. For example, a policy passed that addressed HIV alongside other STDs was excluded from analysis. One exception to this rule was if an amendment was made to an existing ordinance that added HIV to a list of other diseases covered by a particular law; and 2) the policy made substantial changes to how HIV services were carried out, conducted, etc. In other words, policies/amendments passed that were non-substantial in nature (e.g. a word change) were not considered HIV policies.

Organizationally, while the federal data was manually collected from the CDC website and publications, both the state and local data came from a series of surveys. The Association of State and Territorial Health Officials (ASTHO) gathered state level data for four different time periods: 2007, 2010, 2012, and 2016. The local data was collected from the National Association of County and City Health Officials (NACCHO) in five different years: 2005, 2008, 2010, 2013, and 2016. The ASTHO and NACCHO data provide information on the structure, functions, operations, and finances of each organization. Table 1 below shows the details of the survey responses. For feasibility purposes, the sample size for the fs/QCA analyses will be limited to large sized cities. Though there is no consistent measure of a "large" city, this study will consider a large city to have a minimum of 400,000 individuals in the health department's jurisdiction, a minimum population that the Big City Health Coalition (BCHC) set for BCHC membership. This reduces the sample size of local health departments to roughly 160 for each year and includes roughly 75% of all U.S. states.

Table 2: Survey Responses/Data Collected

State Survey* ASTHO	Survey Response Rate (%)	Population	Study Sample
2007	100	50	48
2010	100	50	50
2012	96	50	48
2016	98	50	49
Local Survey			
2005	80	2,300	161
2008	83	2,332	159
2010	82	2,107	160
2013	79	2,532	157
2016	76	2,533	159

*ASTHO data includes territories and DC. This table reflects adjusted response rates and sample sizes to reflect the state responses only.

Variables for Analysis.

Table 3 below outlines each variable, providing descriptions and coding specifications[2]. Importantly, the nature of the logit and QCA analyses vary greatly and thus often required very different coding schemes. Regarding policy adoptions, the logit

[2] Importantly, from the vast literature on change and innovation that spans different disciplines and sub-disciplines, the variables used in this research intentionally exclude those not traditionally and commonly used in organization theory, such as political factors (e.g. political party), and those due to data limitations, such as advocacy and interest groups.

dependent variable and QCA outcome are binary indicating whether policies were adopted post-intervention year. For organizational changes (activities performed), the dependent variable and QCA outcome are also binary, telling whether changes were made regarding HIV or cardiovascular disease screening/coronary heart disease treatment. Data across all years for units of state and local governments were coded based on whether the department performed the activity itself, contracted out the activity, or did not perform it at all. For HIV, changes could have been made regarding screening and/or treatment, while for coronary heart disease, changes could have been made regarding treatment. Each health department was observed to see any changes across these categories (directly performed, contracted out, or did not perform). So, just as a switch from not performing a health activity to directly performing was considered a change, so to was directly performing to not performing at all. The rationale for this coding is that there could be a multitude of reasons for why an organization could make the change that it does. Thus, because the data did not lend to an understanding of why each organization changed the way that it did, I considered any change to be an organizational innovation, being as agnostic as possible and making no assumptions about rationale.

For the top-down case of HIV prevention, the activities observed were how the department performed HIV screenings and treatment services. For the bottom-up case of trans-fat restrictions, the activities observed were coronary heart disease treatment services. Coronary heart disease, a primary purpose the trans-fat bans, can be treated in a variety of ways (Stewart, Manmathan, Wilkinson, 2017) and can directly improve symptoms and reduce worsening of condition (www.mayoclinic.org). Because federal government data is manually collected on the different activities, it does not cleanly fall

into one of these categories. As such, the CDC's financial investment in various activities will act as a proxy for their efforts across various health initiatives. With the federal government being only one case, the changes at this level are described separately.

The logit independent variables and QCA conditions were derived from the literature review. Thus, the variables that affect organizational change are its structural characteristics (as determined by its centralization and specialization) and its resources (as measured by its per capita expenditures and personnel). Centralization determines the locus of decision-making and control for state and local governments. Centralized governments are those where the states retain direct control over the activities and decisions of the local health departments in the states; and decentralized governments are those where the states and local governments are largely independent of each other, being able to make their own decisions (Salinsky 2010). Specialization refers to how many activities the government performs, measuring the extent of their focus on a variety of health issues. Per capita expenditures are used as a proxy for resource capacity. Because revenues were not able to be gathered for all of the organizations from the surveys, it was assumed that the total amount of health expenditures were generally indicative of what the organization was able to spend. Finally, personnel were used as a measure of the organization's resources (e.g. Mays, 2006), as they are critical to carrying out the functions and goals of the organization.

In addition, I controlled for "need" for innovation and existing efforts to address that need. For the top-down case, need is operationalized as HIV diagnoses for every 100,000 people; and for the bottom-up case, this is operationalized as the number of deaths caused by coronary heart disease for every 100,000 people. To control for the

agenda of each organization (recent activity addressing either HIV or coronary heart disease), I created a dummy variable indicating whether the organization had made policy or organizational changes in the decade prior to the intervention. Finally, for the logit analyses, I controlled for whether the government had passed a policy (for policy change) or had made a health service/activity change (organizational change) prior to the intervention year. For the QCAs, this variable was not included. QCA does not "control" for variables like regression methods (Ragin, 2008), and it is most appropriate to include only those variables, or conditions, in the analysis that occur or exist in the same period.

The logit independent variables are a mix of both binary dummy variables and count variables. Count variables include the disease prevalence, total FTE, and per capita health expenditures from each government. Binary variables include the centralized or decentralized decision-making relationship between states and local health departments (whether local health departments are a unit of state government or local government), and whether there are previous policy efforts for a particular health issue. Regarding the unit of government, due to limited sample sizes (e.g. only 50 states), mostly at a state level, data were merged into one dataset, and analyses included this dummy variable indicating whether the organization was a state or local entity. This made all analyses more robust and reliable. For the centralization variable, though not necessarily reflecting how one organization operates and makes decisions, this variable is critical for understanding how health decisions are made (Salinsky, 2010)

The nature of QCA (described in more detail below) demands that all conditions are coded between 0 and 1. The condition centralization, like with the logit, is binary, being a unit of the state government or not; and, also like the logit, the degree of

specialization is coded as the percentage of the total activities that the government performs itself. These conditions did not have to be recoded differently than the independent variables in the logit analyses. The conditions that above were described as count variables (FTE, per capita expenditures, and disease prevalence), however, had to be recoded on the 0-1 scale. To recode these conditions for analysis, the raw data was categorized into quartiles and the top half of the quartiles were coded as 1, and the bottom half of the quartiles were coded as 0. These are also described below in Table 3. Tables 4 and 5 show the descriptives for the data.

Table 3: Variable Descriptions

Logit Dependent Variables/QCA Outcomes

Variable	Variable Description	Logit Coding Description	QCA Coding Description
Initiative Related Activities*	Was there a change in disease service provided?	Binary Variable – Coded 1 if changes in services were made post-intervention year and 0 for no changes.	Coded 1 for a change and 0 for no change in health related activity
Policy Actions	Was there a policy adoption(s) post-intervention year to address the disease?	Binary Variable – Coded 1 if changes in policies were passed post-intervention year and 0 for no policies passed.	Coded as 1 if a policy passed post-intervention year and 0 for no passage of a policy

Logit Independent Variables/QCA Conditions

Variable	Variable Description	Logit Coding Description	QCA Coding Description
Local Government	Is the organization a local or state government?	Binary Variable – Coded 1 for local and 0 for state government.	N/A – analyses run for each level of government
HIV Disease Prevalence**	How many HIV diagnoses exist in the given jurisdiction?	Count Variable – Number of HIV diagnoses per 100,000 people in jurisdiction with disease.	Coded 1 if the jurisdiction was in the top two quartiles of disease prevalence in the sample and coded as 0 if in the bottom two quartiles.

Table 3: Continued

Coronary Heart Disease Death Rate^	What is the death rate per 100k of due to coronary heart disease?	Count Variable – Number of coronary heart disease deaths per 100,000 people in jurisdiction.	Coded 1 if the jurisdiction was in the top two quartiles of disease prevalence in the sample and coded as 0 if in the bottom two quartiles.
Previous Policy Efforts^^	Has a policy/ordinance already recently been passed prior to intervention year?	Binary variable – Coded 1 for yes and 0 for no.	N/A
Previous Change Efforts^^^	Has an activity change recently been passed prior to intervention year?	Binary variable – Coded 1 for yes and 0 for no.	N/A
Centralization	What is the structure of decision-making processes between a state and its local governments?	Binary variable – coded 1 if local health department is a unit of the state health department and 0 if not.	Coded 1 if local health department is a unit of the state health department and 0 if not.
Specialization	What proportion of total activities does the government directly perform themselves?	Coded as percentage of total activities that the organization performs itself.	Coded as percentage of total activities that the organization performs itself.

Table 3: Continued

Total FTE	How many full-time employees (FTEs) does the organization employ?	Count Variable – Number of FTEs	Coded 1 if the jurisdiction was in the top two quartiles of FTEs in the sample, and coded as 0 if in the bottom two quartiles.
Per Capita Expenditures	Per capita health expenditures of health department	Count Variable – Per capita expenditures from most recently completed fiscal year	Coded 1 if the jurisdiction was in the top two quartiles of per capita health expenditures in the sample, and coded as 0 if in the bottom two quartiles.

* Performed: organization performs directly or contracts out; **Not relevant for trans-fat restrictions; ^Not relevant for HIV case; ^^Not relevant for analysis of organizational changes; ^^^Not relevant for analysis of policy change

Table 4: Local Data Descriptives

Conditions for Scaling	Year	Mean/Frequency	Number of Cities/Counties
Centralization (decision-making across local and state governments)	2005	23%	36
	2008	23%	36
	2010	31%	49
	2013	29%	45
	2016	31%	49
Specialization (Activities Directly Performed)	2005	50%	161
	2008	49%	159
	2010	49%	160
	2013	48%	157
	2016	49%	159
FTE count	2005	438	140
	2008	507	141
	2010	489	153
	2013	419	154
	2016	370	133
Total Expenditures (in Millions)	2005	$62.9	140
	2008	$92.3	141

Table 4: Continued

	2010	$78.1	153
	2013	$ 71.9	154
	2016	$ 62.3	133
HIV Diagnoses	2005	255	161
	2008	248	159
	2010	221	160
	2013	187	157
	2016	181	159
Coronary Heart Disease Deaths	2005	255	161
	2008	243	159
	2010	220	160
	2013	192	157
	2016	168	159

Outcomes	**Year**	**Total Policies/Ban Passed**	**Percent Cities/ Counties Passed**	**Number of Cities/Counties Passed**
Policy Change: Passed Policies				
- HIV Policies	1998-2010	202	8%	36
	2011-2017	6	9%	40
- Trans-Fat Bans	Post-2007	14	9%	14

Table 4: Continued

Outcomes	Year	Percent Activity Performed Directly (%)	Percent Activity Contracted Out (%)	Number of Cities/Counties
Organizational: Structural Activities				
- HIV Screening	2005	88	31	161
	2008	87	27	158
	2010	91	26	158
	2013	93	31	154
	2016	92	27	155
- HIV Treatment	2005	40	23	161
	2008	37	22	158
	2010	42	36	154
	2013	41	22	153
	2016	48	26	155
- Coronary Heart Disease Treatment	2005	43	9	161
	2008	46	11	156
	2010	39	10	154
	2013	37	3	151
	2016	34	8	151

Table 5: State Data Descriptives

Conditions for Scaling	Year	Mean/Frequency	Number of States
Centralization (unit of state government)	2007	10%	5
		(27% hybrid)	(13)
	2010	10%	5
		(27% hybrid)	(13)
	2012	8%	4
		(25% hybrid)	(12)
	2016	9%	4
		(26% hybrid)	(11)
FTE count	2007	2,277	45
	2010	2,249	46
	2012	2,020	47
	2016	1,989	49
Total Expenditures	2007		
	2010	$216.2	46
	2012	$581.1	48
	2016	$545.8	49
Specialization	2007	44%	48
	2010	46%	50
	2012	42%	47
	2016	42%	49
HIV Diagnoses			
	2007	943	48

Table 5: Continued

	2010	842		50
	2012	818		47
	2016	792		49
Coronary Heart Disease Deaths	2007	253		48
	2010	220		50
	2012	204		47
	2016	183		49

Outcomes	**Year**	**Percent Activity Performed Directly (%)**	**Percent Activity Contracted Out (%)**	**Number of States**
Organizational: Structural Activities**				
- HIV Screening	2007	54	89	48
	2010	62	-	50
	2012	64	80	47
	2016	61	92	49
- HIV Treatment	2007	31	82	44
	2010	56	-	50
	2012	31	71	48
	2016	33	78	49
- Coronary Heart Disease Treatment	2007	5	14	43

Table 5: Continued

	2010	8	-	50
	2012	8	17	48
	2016	6	14	49

Outcomes	**Year**	**Total Policies/Ban Passed**	**Percent States Passed (%)**	**Number of States**
Policy Change: Passed Policies				
- HIV Policies	1998-2010	168	78	39
	2011-2017	88	60	30
- Trans-Fat Bans	Post-2007	7	12	6

*2007 ASTHO does not provide data on FTE allocations

**2010 survey does not have "contracted out" option, only an "other"

^2007 Total expenditure data not available

Analyses.

Within the top-down and bottom-up scenarios, policy and organizational changes are examined using two main analyses: logit modeling and QCA. Both methods use the variables/conditions described above.

Analysis 1: How Do Policy and Organizational Changes Occur and Diffuse over Time? Using panel data, I tracked how policy and structural changes diffuse horizontally

and vertically across levels of government. Over time, I assessed differences in the factors that drive policy and structural changes.

To do this, I tested a series of models to account for the distribution of my data. The dependent variables in this study, whether policies were passed and whether service changes were made regarding HIV and coronary heart disease, are binary variables. Being binary, the most appropriate and simplest model for analysis is a logit model. Logit modelling is a form of regression that models binary dependent variables. Here, the dependent variable is the natural logarithm of the odds and can stretch from negative to positive infinity, but its probability stays between 0 and 1 (Cameron and Trivedi, 2010).

Robustness Checks. However, these dependent variables, namely the policy change variable accounting for whether policies have been passed, have an excess number of zeros, or a vast number of jurisdictions that never passed a policy post-intervention. This gives my distribution a long right tail. Because of the large number of zeros and resulting over-dispersion, I employed models that account for this distribution, as a means of seeing how well the results of my logit models are upheld. These results can be found in Appendix A.

For these analyses, I began each analysis by first conducting models meant to account for such dispersion. As recommended (stats.idre.ucla.edu), I first ran zero-inflated models to account for the extra zeros in my data. The goal of zero-inflated models is to account for excess zero counts in the dependent variable. In total, two different types of zeros are estimated: the true zeros in the data and the excess zeros. This method thus has two parts: a Poisson count model and a logit model to predict the excess zeros. This model should be used when the conditional variance is not much greater than

the mean (Cameron and Trivedi, 2010). Negative binomial regression is specifically used when there is over-dispersed count data, or when the conditional variance is greater than the conditional mean. This method is a generalization of Poisson regression (having a similar mean structure), with the difference being that there is an extra parameter to model over-dispersion (Cameron and Trivedi, 2010). To test for model fit, a significant *z* score for the zero-inflated model indicates that the zero-inflated negative binomial model was preferred to an ordinary negative binomial. If an ordinary negative binomial model was run, then the next step was to look at the chi-square statistic. An insignificant chi-square indicated that a normal Poisson model was most appropriate (stats.idre.ucla.edu). Table 6 below shows the results of these robustness tests and the method for each model. Ultimately, these tests suggested that in all but one case, an ordinary Poisson model was most appropriate to run, with one case holding that a negative binomial regression model ought to be used. Importantly, across all models (zero-inflated negative binomial, negative binomial regression, and Poisson models) all results presented in the following section were upheld, indicating a consistency of the data. Tables A1 and A2 in the Appendix shows the differences between these models and the main Logit models described above.

Table 6: Robustness Check Model Specifications

	Models
Top-Down Policies- All Years	Negative Binomial Regression
Bottom-Up Policies- All Years	Poisson

Analysis 2: Under What Conditions Does Change Occur for Policy and Organizational Dimensions of Government? This analysis was conducted using a series of qualitative comparative analyses (QCAs). The QCAs determined the conditions under which change occurred after top-down and bottom-up health initiatives were first established. As with any kind of change (individual or inter-organizational change), it is important to understand why organizations are innovative and the conditions that enable them to innovate, such as by adopting policies or adjusting organizational strategies.

QCA techniques belong to the so-called set-theoretic methods family. Set-theoretic methods are distinct from other methods in that they examine phenomena using sets, looking for relations among the components of sets. Relying on Boolean algebra and set theory, QCA examines the relationships of variables (called conditions) in a given set of conditions among a variety of cases. Across these cases, QCA is not interested in the correlations of individual conditions, as in regression, but rather on the relationships among the conditions in each of the cases. Thus, the method identifies how these different conditions in the sets combine to form multiple causal configurations that produce an outcome. QCA is an appropriate method for this research because, consistent with the complexity of government, it pays attention to various pathways that can lead to a single outcome.

Table 7 presents two different configurations that led to a passage of policy in a sample population. The first result holds that the presence of condition A and the absence of condition B and the absence of condition C and the presence of condition D contribute to a passage of policy. However, the sets of conditions across the cases combined in another pattern to also lead to the same outcome. The second solution holds that the

absence of A and the presence of B and the absence of C and the presence of D contribute to a passage of policy. Overall, both configurations are well represented across our cases (as seen in the solution consistency) and explain a passage of policy well (as indicated by the solution coverage). Individually, though, the two different combinations are not equal. Typically, we look at the unique coverage scores to indicate which configuration best explains the outcome (a passage of policy). This example shows that the first combination has a unique coverage score of 0.23, which is higher than the 0.17 coverage score of the second combination. Therefore, the first solution is considered the stronger of the combinations.

Table 7: QCA Example Output for a Passage of Policy
Intermediate Solutions

	Raw Coverage	Unique Coverage	Consistency
A * ~B * ~C * D	0.29	0.23	0.89
~A * B * ~C * D	0.19	0.17	1.00
Solution coverage: 0.69			
Solution consistency: 0.95			

Similar to R^2

Similar to P-value

Strength of individual path

This method is similar to regression techniques, like the logit above, in that QCA works by determining whether different variables (conditions) lead to variability in a dependent variable (outcome). However, the method differs fundamentally from regression analyses. Primarily, in regression, we isolate the effects of independent variables on a dependent variable while holding constant the average value of the other independent variables; but in QCA, we assess the combinations of *all* the conditions simultaneously in a particular set of conditions that consistently appear or do not appear together that lead to a specific outcome. Thus, a QCA never assumes that the effect of one condition is the same across all cases, rather it is the presence or absence of that condition in conjunction with the other conditions among the different cases that leads to an outcome. This allows the researcher to gain a more nuanced look into why and how change occurs because we can evaluate all of the different possible combinations of conditions that lead to a top-down or bottom-up change (Ragin, 1987).

However, the different combinations of conditions are not equally strong in leading to the outcome of interest (passing a policy). Two components of QCA output indicate goodness of fit: solution consistency and solution coverage. The strength of the combinations is determined by the QCA's solution consistency, equivalent to regression's p-value. Consistency indicates the proportion of cases with the causal conditions that have the outcome of interest. The solution coverage, however, determines how well the set of conditions explain the outcome of interest, similar to an R^2 value in regression (Thygeson, et al. 2012). This is the proportion of cases exhibiting the outcome that can be explained by the combinations of conditions. Given that its focus on finding multiple pathways to an outcome, QCA calculates both the total coverage and

consistency scores for all pathways, as well as unique coverage and consistency for each path. For example, Table 7 above presents an example fs/QCA output.

Performing an Fs/QCA. Centered on sets of conditions, an application of QCA techniques begins with the operationalization and calibration of sets. This early step is driven by a theoretical understanding of the conditions relevant to the outcome of interest (Schneider and Wagemann, 2012). Each condition is numerically coded to the extent to which it belongs in a given set of conditions that explain the outcome. A condition's membership in a given set can be dichotomous, meaning the variable is in the set or it is not (referred to as a crisp set), or the condition exists in degrees of membership (known as a fuzzy set) (Ragin, 1987). Crisp sets have conditions coded as either 0 (not in the set) or 1 (in the set), while fuzzy sets have conditions that that are coded as values between 0 and 1, inclusive (Ragin, 2008). For example, a crisp set could be an organization that has a male leader (coded as 1) or it does not (coded as 0); a fuzzy set could be the proportion of activities that an organization directly performs itself out of its total activities, giving the condition a value between 0 and 1. Table 8 below indicates Ragin's (2000) conception of set membership.

Table 8: Set Membership Codes

1.00 = fully in
0.80 = mostly in
0.60 = more in than out
0.40 = more out than in
0.20 = mostly out
0.00 = fully out

Source: Ragin (2008)

After the conditions are coded, truth tables are created for each case based on the coding of each condition. The truth table shows the possible combinations of the presence or absence of each condition (Marr, 2012). All truth tables for this analysis are in Appendices B and C. Once the truth table is created, decisions are made regarding thresholds for patterns. The first threshold to select is the frequency threshold. This threshold sets the standard for the number of cases with at least 0.5 membership in each configuration of conditions. I selected the recommended threshold of 1 case for all of the QCAs conducted. The second threshold to select is the consistency threshold, which is the proportion of cases that exhibit a particular pattern of conditions. For all of the QCAs selected in this research, I selected the recommended minimum threshold of 0.75 (Ragin, 2008). The final step is to test for necessary and sufficient conditions. Necessary conditions are those conditions that are always present when the outcome occurs. Sufficient conditions that explain the outcome are those where the outcome always occurs if the condition is present, even if the outcome occurs under different conditions

(Manuel and Verissimo, 2016). This provides more nuance into the relationships between the conditions and the outcome.

Fs/QCA in This Study. Two different sets of QCAs will be run for each year post intervention year. For example, Winnable Battles was established in 2010; so, the sets of QCAs will be conducted for each year of data following 2010. For local health departments and state health departments, all of the data is from the associated surveys, providing total sample sizes of roughly 2,000 LHDs and all 50 states. Because the federal government represents only one case, a QCA cannot be performed on this level alone. I will attempt to compensate for this limitation by manually observing changes in federal government activity, budgeting, and employee/leader allocations across the CDC.

Table 9: Fs/QCA Analyses

	Unit of Analysis	Outcomes
Top-Down Analysis		
HIV Prevention	State Government	Policy change
		Structural change: Activities performed
	Local Government	Policy change
		Structural change: Activities performed
Bottom-Up Analysis		
Trans-fat Ban	Local Government	Policy change
		Structural change: Activities performed
	State Government	Policy change
		Structural change: Activities performed

Fs/QCA Limitations and Robustness Checks. Although Ragin (1987) initially intended this method to be for small and medium sample sizes, some scholars argue that QCA is appropriate for large sample sizes if theoretical arguments are expressed in set-theoretic terms (Schneider and Wagemann 2012). As such, QCA is being used more frequently as a method for medium and large samples (e.g. Fiss 2011; Ragin and Fiss 2008; Vis 2012). A critical challenge for using fs/QCA for large-n analyses is that with a large sample, the

researcher loses the ability to be "case-oriented", meaning that it is difficult, if not impossible, to discuss specific cases of successful condition configurations. This suggests that measurement errors in coding of cases are more likely (Fiss, Sharapov, and Cronqvist, 2013). However, other scholars have suggested that such limitations can be adjusted for with robustness checks (e.g. Skaaning, 2011). Skaaning (2011) suggests that the robustness of the analysis can be determined by adjusting the consistency and frequency thresholds and coding calibrations and re-running the analyses to check for uniformity of results. The threshold is important because it indicates how consistently a specific combination leads to the outcome of interest. Because no hard threshold has been established for QCA, the analyses here will be conducted using a threshold of roughly 0.75. The robustness check will use higher thresholds (0.8 and 0.9) to see if patterns hold. Emmenegger, Schraff, and Walter (2014) additionally propose that the random deletion of "shares of cases" acts as a sufficient check as well. The results largely held, with the only exception being a reduced number of configurations identified. This indicates a robustness of findings. The results presented below show the findings with the initial 0.75 threshold.

CHAPTER 5: TOP-DOWN CHANGE RESULTS

With this study I sought to better understand how the different dimensions of government relate to each other by analyzing how public policy changes are similar to organizational changes in multilevel systems. To answer this question, I used two different analyses: logistic regression models and QCA. Both analyses were conducted identically for a case of top-down change and bottom-up change. This chapter is thus divided into two main sections: the top-down scenario and bottom-up scenario. The following discussion chapter reconciles the findings of both.

Overall, in assessing government complexity in the top-down case, I find that the two different functions of government are largely distinct, meaning whether a government innovates in terms of policy or activity changes is determined by different factors. So, it is likely that different contexts and scenarios make one form of innovations more feasible or plausible. These results are described in more detail below in the subsections regarding each analysis.

Descriptive Results.

The descriptive results provide indication that both policy and organizational (activities performed) changes were made across state and local levels of government after the intervention. Policies were passed post-intervention by both state and local governments who had activity prior to the intervention and those who did not; and organizationally, there were jumps in services provided around post-intervention years at both levels of government. However, policy and organizational innovations did not always simultaneously occur.

The top-down case of HIV prevention was initiated by the CDC program Winnable Battles in 2010. States overall were more active in passing policies in this scenario, as not even 10% of local governments passed policies post-intervention, with a fairly even distribution of policies passed over the years post-2010. Organizationally, the number of state and local governments performing activities with to HIV screening and treatment services varied (Tables 4 and 5). However, despite the varying levels of government, the trends for changes made organizationally were similar across both state and local levels. For organizational activities regarding HIV, the activities of state and local governments are opposite than those of policy changes. Local governments were much more active in performing HIV screening and treatment activities. This aligns with what we know about the roles of state and local health departments, where local health departments are more connected to their communities, playing more of a front-line and direct role with the services that they provide (CDC, 2013). Despite the fact that LHDs are more active in the services they provide, both state and local governments exhibited similar descriptive trends, where beginning in 2010 (the start of Winnable Battles initiative), more of both state and local governments directly performed HIV screenings and treatment services. With the exception of HIV treatment services provided by states, this increase in the number of governments providing HIV services largely held in the years following 2010.

Because this research was attempting to capture and understand the complexity of government, I cross-tabulated the data to understand how these two types of innovations co-occurred. Table 10 shows crosstabs of the top-down case. The results illustrate that often times when a jurisdiction did pass a policy, there was no change in services

adopted; and likewise, when an administration change to HIV was adopted, there was not always a policy adopted by that same jurisdiction. On a surface level, this suggests that policy and organizational change are not necessarily stemming from each other. Table 11 adds to this story by showing how policy adoptions and organizational changes are significantly different than each other. Thus, like the crosstabs showed, organizations that adopt policy changes are not necessarily those that adopt organizational changes. This also potentially indicates that organizational and policy changes do not necessarily co-occur. This begs the question addressed by the following analyses: how do policy change and organizational change differ? Who is adopting one compared to the other? What factors drive policy compared to organizational changes.

Table 10: Top-Down CrossTabs

HIV Policies Passed	Changes in HIV Screenings and Treatments Performed				Total
	0	**1**	**2**	**3**	
0	230	96	21	2	349
1	21	3	2	2	28
2	5	6	1	0	12
3	1	0	1	0	2
4	2	0	0	0	2
5	0	1	0	0	1
6	0	1	0	0	1
8	0	0	1	0	1
10	0	1	0	0	1
17	1	0	0	0	1
25	1	0	0	0	1
Total	261	108	26	4	399

Table 11: HIV Top-Down T-Test

Variable	Mean	SE	SD	95% Confidence Interval
HIV Activity/Service Change	0.35	0.02	0.48	0.30 – 0.40
HIV Policy Adoption	0.15	0.02	0.36	0.12 – 0.19
Difference	0.19	0.03	0.59	0.14 – 0.25
Ho: mean (Service Change - Policy Adoption) = 0			**t** = 6.69	**Pr(t)** = 0.00

Logit Modelling Results.

Following the descriptive results, I conducted logit analyses to understand the factors that drive policy and organizational innovations, and I had two main groups of models: top-down policy change and top-down activity change. In each of these categories, I ran an overall analysis (looking at all policy changes or all activity changes over all post-intervention years combined) and analyses for each individual year of data post-intervention year for comparison of change over time. Two overarching findings appeared from the logits: 1) policy and organizational changes are not always driven by the same factors; and 2) the factors that drive policy and organizational changes vary over time, though they do not become more uniform.

Policy Change. Top-down policy change was driven by two characteristics (Table 12): centralization and FTEs. The significance of FTEs ($p<.01$) suggests that responding to top-down initiatives requires some form of capacity to actually adjust, such as having the required personnel. Regarding centralization, the results showed that state and local governments in decentralized relationships were significantly more likely to pass HIV policies after the 2010 CDC intervention. Over time, this effect became stronger, not being significant until 2016, indicating no generalizable difference between centralized and decentralized relationships early on; but organizations in decentralized relationships were more likely be able to respond to federal initiatives politically in later years.

Interestingly, the effect of the current legislative agenda was not indicative of whether a policy was passed post-intervention. So, state and local governments with and without HIV on their recent legislative agendas were both responding to the top-down call for attention to HIV. Also, top-down policy change was not driven by level of

government. In other words, a federal initiative was not significantly influenced by the adopting organization being either a state or local government. The coefficient on government type was negative in 2013, but positive in 2016, indicating that state governments were more likely to be adopting HIV policies in early years, and local governments in later years; but these variables were insignificant. So, overall, top-down policy responses are not necessarily driven by one level of government. Further, need was not predictive of policy adoptions. Governments were responding to the initiative regardless of whether they had a high HIV prevalence. These findings could speak to the authoritative nature of top-down change, able to penetrate multiple levels of government, regardless of agenda and need. (Kettl, 2016; Ostrom,V., 1994).[3]

Table 12: HIV Policies Passed

	All Years	2013	2016
Centralization	-0.63*	-0.23	-2.08**
Local Government	-0.40	-1.09	0.39
Specialization	-0.31	-1.46	2.43
HIV Diagnoses Per 100k	0.00	0.01	0.02
FTE	0.00**	0.00*	0.00*
Per Capita Health Expenditures	0.00	0.01	-0.00
Policies Passed Pre-Intervention	1.10	1.03	1.52
Constant	-2.12*	-1.06	-4.37*
Observations	308	170	138

*** p<0.001, ** p<0.01, * p<0.05

[3] The results of the sensitivity analysis where the assumption regarding policy adoptions being counted for both cities and counties in the dataset was excluded can be found in Appendix A. The results aligned well with Table 12, with level of government being added as a significant factor.

Organizational Change. Similar to policy change was the effect of centralization. Organizations in decentralized relationships were more likely to adopt HIV policies post intervention. This may be due to a lowered span of control, and therefore lowered complexity, enabling more decentralized organizations to be innovative than those with more bureaucracy in place. Like above, this effect also got stronger over time.

However, unlike policy change, trends in organizational change are largely different than policy changes in that these relevant structural factors vary depending on level of government. This is not surprising given that these service changes are actual changes made to the structure and operations of governments; and it aligns with existing theory that change, especially for lower levels of government, are highly dependent on institutional factors (Clouser, et al., 2015). Changes in HIV services were significantly affected by whether the government had made HIV service changes in recent years prior to the intervention ($p<.05$) (Table 13). This could make HIV innovations less disruptive to routines, as previous changes may not have been routinized to a point where inertia to change was strong (Rainey and Fernandez, 2006). The significance of this variable fades over time, potentially suggesting that those governments where HIV was already on the legislative agenda were able to adopt changes faster than those without HIV already in focus. This could make it easier to enact change (Kettl, 2016; Shipan and Volden, 2006). This weakening effect over time of HIV prevalence and the political agenda likely indicates other rationales and enablers for change, such as mimesis or learning of effective strategies to address an issue (e.g. Berry and Berry, 1990).

Also, different than policy change, level of government mattered. For top-down organizational changes made to HIV services provided, state governments largely led the

charge ($p<.001$). Across the individual years after the intervention, this variable gained significance, though it remained negative, indicating that state governments increased the likelihood of HIV services changes, especially in later years. Also, institutional factors mattered for organizational changes across all years. Results show that those organizations where state and local governments had decentralized relationships were more likely to make changes to HIV services ($p<.05$). This makes sense given what we know about centralization and innovation. Existing research has demonstrated that the more centralized the organization, the lower the rates of innovation adoption (Damanpour, 1991). Udy (1965) argued that this is the case in part to the environments in which organizations exist, where varying environments and conditions necessitate targeted action. Thus, if a state has decentralized relationships with its local governments, which exist in different environments, then innovative behavior could be more likely because each locale can respond in ways most appropriate to them. Further, having very centralized decision-making between a state and its many local governments increases span of control. This can affect how complex the decision-making process becomes, potentially inhibiting innovative or change behavior (Blau, 1968; Barnard, 1938).

Table 13: HIV Screening and Treatment Changes

	All Years	2013	2016
Centralization	-0.43*	-0.35	-0.61
Local Government	-1.20***	-0.64	-2.30***
Specialization	-0.34	0.47	0.02
HIV Diagnoses per 100k	0.02	0.03	-0.01
FTE	-0.00	-0.00	0.00
Per Capita Expenditures	-0.00	-0.00	-0.01
Changes Made Pre-Intervention	0.54*	0.90**	0.19
Constant	0.18	-0.55	0.89
Observations	318	175	143

*** p<0.001, ** p<0.01, * p<0.05

Fs/QCA Results.

In this analysis, I followed up the logit analyses by asking the following questions: under what conditions does change occur and are these conditions the same for organizational and policy change? For the top-down case, no necessary conditions were found. The results presented below show only sufficient patterns of conditions, confirming the notion that conditions are context driven and patterns matter. For the top-down case, HIV prevention, I conducted a QCA with the outcome of whether any policy adoption occurred after the Winnable Battles HIV initiative for both states and local governments. Multiple QCAs were conducted. First, I ran a QCA for the post-intervention time period as a whole, with the outcome of interest being whether an HIV policy was passed at any point between 2011 and 2017. Second, I followed this analysis with one QCA for the first half of that time period (2011 to 2013) and the second half of that time period (2014 to 2017).

Policy Change. For HIV policy adoptions, patterns of adoptions were identified for state but not local governments. This means that local HIV policy adoptions were more sporadic, following less of a pattern. This lack of consistent patterns of adoptions on a local level is not surprising, as local change is often unpredictable, as there are many different political venues for change to occur (Boushey, 2012). In this case, it could additionally be that state level HIV efforts were deemed sufficient and local governments directed their agendas elsewhere.

Across all years combined, two different patterns of conditions emerged for states who passed an HIV policy (Table 14). Of these, one had the highest unique coverage, indicating the strongest pattern (unique coverage score of 0.15). This pattern shows that states that passed HIV policies had very decentralized relationships with their local health departments (centralization), had a high number of full-time employees, had a relatively high amount of yearly per capita expenditures, and had a relatively high HIV prevalence in the state. This means that those state governments that adopted HIV policies had a need and also the resources to address that need. Further, being in a decentralized relationship with their local governments, means that they cannot necessarily rely on local governments to make the change. Thus, a high HIV prevalence indicates a need, but if they want to adequately address that need, they may need to make the policy change themselves instead of relying on local levels to do the work.

Table 14: All Policy Changes – State - Top Down
Intermediate Solutions

					Raw Coverage	Unique Coverage	Consistency
Large Expend *	High Prev *	Large FTE *	Decent		0.15	0.15	0.88
Small Expend *	High Prev *	Small FTE *	Small Activities *	Decent	0.06	0.06	1.00
Solution coverage:	0.21						
Solution consistency:	0.91						

Across all patterns, a few notable trends exist. First, a high HIV prevalence contributed to a passage of policy in both patterns. This suggests that for top-down change, having a need for a change has a major (though not necessary) role in whether the organization responds. The only variable consistent across both patterns was centralization, where decentralized state and local relations led to a passage of policy. This is likely due to the lowered span of control or complexity that can come from decentralized control, where adapting to change may be easier (Hannan and Freeman, 1984). Otherwise, the varying presence and absence of the other conditions emphasizes the point that organizations of a variety of structures regarding centralization and resources innovate politically. Importantly, given the low solution coverage (0.21), I interpret these results cautiously, as this indicates that other patterns exist that are not found in my cases.

When we break out the changes made into the two different data time periods (Tables 14a), we see the above patterns fluctuate a little bit, but importantly, only patterns of early adopters could be identified. Later adopters, adopters between 2014 and 2017, showed no consistent pattern, so none were identified. This somewhat aligns with the diffusion models (Berry and Berry, 2014) that describe an increase in adoptions that ultimately tapers off. So, it is likely that many states responded quickly to the federal call for change, with inconsistent patterns of laggards behind them. The pattern of those states that responded early is as follows: those states that passed an HIV policy between 2010 and 2013 were those states that had decentralized decision-making structures with their local governments, performed a narrow range of public health activities, had a small number of full-time employees, a relatively low number of health expenditures, and a

high HIV prevalence. The period of early adoptions emphasized that having adequate resources to make changes was not necessary to respond to a federal call for change, perhaps indicating that responding to a federal call for change could be enough impetus, as suggested by Baumgartner and Jones (2009) and Shipan, and Volden (2015). However, as with across all years, having a need was a contributing factor for adoption.

Table 14a: 2010-2013 Policy Changes – State - Top Down
Intermediate Solutions

					Raw Coverage	Unique Coverage	Consistency
Small Expend *	High Prev *	Small FTE *	Small Activities *	Decent	0.09	0.09	0.77

Solution coverage: 0.09

Solution consistency: 0.77

We can see some consistencies in the breakout years to the overall policy adoptions patterns in Table 14. State policy adoptions occurred when there was a need (HIV prevalence). However, this need was paired with organizations having varying amounts of resources, indicating that having resources at the disposal of the government was not necessarily critical to them passing policies. Finally, the passing of policies occurs in different structures, with varying degrees of span of control and specializations. Overall, below the federal level, change can be unpredictable (Boushey, 2012), especially in health where the roles of responsibilities are often interdependent and not always defined.

These policy patterns in the top-down case demonstrate two key findings: 1) that at least in terms of policy, local policy adoptions are more sporadic than state policy adoptions; and 2) that while a variety of structures contribute to a passage of policy, need and decentralization mattered most consistently.

Organizational Change. In the analysis on organizational change, I examined whether there was a change in how HIV screenings and treatment services were provided. As with above, QCA analyses were run on two fronts: overall change, where the outcome variable reflected a change in services across all years; and change as reflected in individual groups of years post-intervention. Overall, a few trends are worth noting before QCA specifics are discussed. First, the lack of consistent patterns found in the analysis of policymaking change at the local level was not found in the assessment of organizational change. Second, the patterns that lead to organizational change in local levels are not similar to the patterns identified at the state levels, meaning that the factors that lead to organizational changes vary depending on level of government. Third, in this scenario,

need for change (e.g. a high HIV prevalence) was present in every pattern for local government adoption. So, those jurisdictions that responded to the CDC were those that actually had a reason to innovate.

Both state and local governments had changes in how (or if) they provided HIV services (Tables 5 and 6). Of the nearly 80% of states that changed how they provided HIV services to their jurisdictions, five different patterns of statewide conditions emerged as contributing factors to organizational change. As seen below in Table 15, one pattern had the highest unique coverage (0.17), indicating the most relevant configuration of conditions. This pattern holds that those states that adjusted their HIV service strategies were those that had decentralized relationships with their local governments, performed a small range of activities, had a relatively low per capita and number of FTEs, and HIV prevalence was irrelevant to the outcome. Among the roughly 54% of local governments who adopted HIV changes, the strongest configuration on the local level (Table 16) also had decentralized relationships with their respective state governments and high HIV prevalence, but different than states, had high amounts of resources (FTE and per capita expenditures). So local governments passing organizational changes had both a need to address, but also adequate resources to enable them to meet that need. Also, being in decentralized relationships with the state governments could mean that local governments who have a need for change (e.g. a high HIV prevalence) are able to make a decision to change independent of the state (centralization). This may enable a flexibility to adjust their routines and resources that they have to address the need without having to go navigate bureaucracy. So, while the logit models demonstrated that structural factors matter, the QCAs suggest that organizations in a variety of structure can be innovative.

Table 15: All Organizational Changes – State - Top Down
Intermediate Solutions

				Raw Coverage	Unique Coverage	Consistency
Large Expend *	Small FTE *	Small Activities *	Decent	0.16	0.04	1.00
Large Expend *	Small FTE *	Low Prev *	Small Activities	0.15	0.02	0.79
Small Expend *	Small FTE *	Small Activities *	Decent	0.14	0.17	1.00
Large Expend *	Low Prev *	Small Activities *	Decent	0.1	0.00	1.00
Small FTE *	Low Prev *	Small Activities *	Decent	0.02	0.00	1.00
Solution Coverage: 0.38						
Solution Consistency: 0.91						

Table 16: All Organizational Changes – Local - Top Down Intermediate Solutions

				Raw Coverage	Unique Coverage	Consistency
Large Expend *	High Prev *	Large FTE *	Decent	0.24	0.24	0.94
Small Expend *	High Prev *	Large FTE *	Cent	0.09	0.09	0.77
Solution coverage:	0.33					
Solution consistency:	0.89					

Top-Down Change: By Years. Looking at how patterns evolve over the years can offer more nuance into how and why organizations change. Descriptively, despite local governments being more on the forefront of providing services to their communities, top-down change structurally was more common among states. For the 2010-2012 time period, almost half of the states made changes with how they provided HIV screening and treatment services (43%). Over half (67%) made changes between 2013 and 2016. For local governments, however, 43% made changes between 2010 and 2013, and 38% between 2014 and 2016.

Table 15a: 2010-2013 Organizational Changes – State - Top Down

Intermediate Solutions

					Raw Coverage	Unique Coverage	Consistency
Small Expend *	High Prev *	Small FTE *	Small Activities *	Decent	0.09	0.09	0.77
Small Expend *	Low Prev *	Large FTE *	Small Activities *	Decent	0.08	0.08	0.75
Solution coverage: 0.18							
Solution consistency: 0.76							

Table 15b: 2014-2016 Organizational Changes – State - Top Down

Intermediate Solutions

					Raw Coverage	Unique Coverage	Consistency
Large Expend *	High Prev *	Small FTE *	Small Activities *	Decent	0.04	0.04	1
Large Expend *	Low Prev *	Small FTE *	Small Activities *	Cent	0.05	0.05	0.75
Small Expend *	High Prev *	Large FTE *	Small Activities *	Decent	0.17	0.17	0.93
Large Expend *	Low Prev *	Large FTE *	Small Activities *	Decent	0.02	0.02	1
Solution coverage: 0.29							
Solution consistency: 0.90							

Between the sets of patterns for states (Tables 15a and 15b), there were no obvious changes in structure or conditions that affect adoption over time. Both years have adopters with both high and low HIV prevalence and high and low amounts of resources at their disposal to make those changes. This could indicate that the CDC's authority drives innovation even when a need or resources (e.g. Mays, 2006) are not present. However, the patterns of early adopters of organizational changes for states include the same pattern of early adopters for policy changes. For understanding about how these types of innovations relate, this means that while generally policy and organizational changes are driven by different factors, there are instances where they align.

Regarding local governments, patterns for these year breakouts were identified only for 2010-2013. Thus, as with the bottom-up case, local government organizational changes are generally made more whimsically, with no consistent structures contributing to change. The early identification of patterns indicates that the early adopters of change were representative of a certain type or structure of organizations, with later adopters representing more a variety of organizations making changes. This could speak to the learning mechanism of diffusion, where local organizations began learning from early adopters, and so the greater variety of organizations adopting increases. According to the results (Table 16a), two different patterns emerged for those local governments that passed organizational HIV changes. These patterns were of equal strength. Overall, local government patterns demonstrated that change demands a need (high HIV prevalence), is not necessarily contingent on resources (expenditures), and can occur in different types of structures (centralized vs. decentralized).

Overall, different patterns existed for state and local governments. Interestingly, unlike local governments, changing HIV strategies for states was not always preceded by a high HIV prevalence. In fact, the strongest state pattern held that the HIV prevalence was irrelevant to whether organizational changes were made. Thus, the motivation for change may be stemming from more than just a need, but rather influences that could be authoritative or normative in nature (e.g. Berry and Berry, 1990). Further, local government patterns more often included high numbers of FTEs and per capita expenditures. This may therefore suggest that for states to change structurally, it requires more resources, especially if the activity is not one of the few already performed by the health department.

Table 16a: 2010-2013 Organizational Changes – Local - Top Down

Intermediate Solutions

					Raw Coverage	Unique Coverage	Consistency
Large Expend *	High Prev *	Small FTE *	Large Activities *	Decent *	0.03	0.03	0.82
Small Expend *	High Prev*	Large FTE *	Small Activities *	Cent *	0.03	0.03	0.77
Solution coverage: 0.06							
Solution consistency: 0.79							

Across state and local governments, however, we do see that while those in centralized and decentralized relationships both adjusted their HIV services, indicating that change can occur in a variety of structures. Yet, the strongest patterns upheld the role of decentralized relationships contributing to change, as well as performing a narrow range of activities. This is likely due to a decreased amount of bureaucracy tied to a larger and more complex system of decision-making processes to enact a change internally (Blau, 1968; Greenwood and Hinings, 1996). These patterns do not align with the patterns of early policy or organizational adopters for states.

Top-Down Discussion.

The descriptive results, logit analyses, and QCAs give us three main findings. These are shown below in Figure 4. First, the factors that drive policy and organizational change are not the same. FTEs, level of government, and the role of the agenda distinguished between the two change types. Importantly, while primarily differences were found, there was one case where policy and organizational innovations had identical QCA patterns of conditions. This means that there is in fact some overlap among the factors in certain contexts. Here, that context was for early state adopters to a top-down initiative and could speak to the role of authority of a federal initiative.

Second, need for change presented an interesting result. A need for change did not affect either policy or organizational changes in the logit models. However, the QCAs added some nuance to these findings, especially in running state analyses separate from local analyses. Two findings regarding need appeared: 1) every local government pattern included high HIV prevalence. States were more varied. This demonstrates some distinction between level of government as states, maybe reacting to the authority of the

CDC, responded regardless of prevalence, whereas the lower level governments responded only when there was a need. This could suggest that the vertical diffusion effects fluctuate as ideas spread down the levels of government; 2) the results showed that the presence of a need for change (for states) was not always present for organizational/structural change, like it was for policy change. This means that between policy and organizational change, having a need for change matters more for policy, a much more visible response to an issue (Kettl, 2016) than structural changes, potentially suggesting that organizational changes are motivated by some mechanism other than need. Answering the research question that policy changes would be more sensitive to a need for change, it is likely that policy was driven by a need as policy can often be a very visible response to constituents, neighboring governments, etc. (Kettl, 2016), and the connection between a need and a visible response could be explained by a political desire to appear active in addressing the issue.

Third, policy and organizational changes look different for each level of government. In the top-down case, there are two main conclusions regarding level of government: 1) local government adoptions are generally more whimsical and sporadic than state adoptions; and 2) that the differences between policy and organizational changes vary depending on level of government. Descriptively, we were able to see policy and activity/service changes made at each level, though state governments were more active in responding in terms of policy than local governments, and local governments were more active in changing their activities than state governments. The QCA results took these findings a step further, showing us that while both of these levels of government are making changes organizationally and in terms of policy, the conditions

that enabled each to change varies. Notably, local government service changes had patterns whereas local policy adoptions did not, and state patterns of both policy and service change adoptions existed. Across the patterns that were found, the strongest state patterns for policy and organizational changes had similarities of patterns regarding certain conditions like HIV prevalence, but the presence of resources and varying structures were different across local and state patterns, meaning that not only do the processes vary across levels of government, but for each level, the process of changing in terms of policy compared to organizational structure varies.

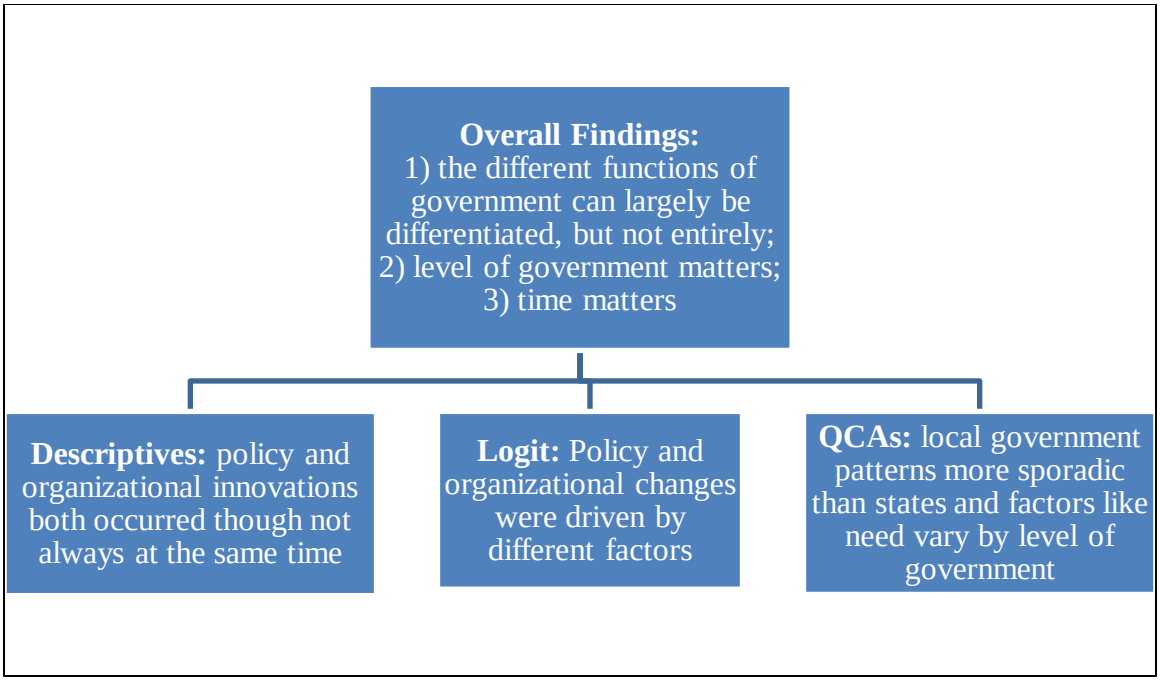

Figure 4: Top-Down Change Results.

CHAPTER 6: BOTTOM-UP CHANGE RESULTS

Complexity of government was tested in a different scenario – the bottom-up case of trans-fat restrictions. As with the top-down case, the two different functions of government can be separated by what drives them to innovate; but here, no instance of an identical or very similar patterns exists. I also find that level of government matters, timing of innovation adoption matters, and need once again plays an interesting role.

Descriptive Results.

The bottom-up case, trans-fat restrictions, demonstrated some differences between organizational and policy change, and, similar to the top-down case, differences between state and local governments. Starting at the local level, different cities (about 14% of sample) adopted a trans-fat restriction to some extent, including city-wide bans (e.g. New York City) and school district bans (e.g. Miami-Dade County). Cities were the first to ban trans-fats citywide, with most policy efforts being adopted within the first two years of the first trans-fat ban (Table 8). After the first full state adoption (California in 2008), no other states passed full statewide restrictions, though others have partial restrictions (e.g. Colorado). Importantly, all state laws here that were passed before California's statewide restrictions did not target trans-fats, rather they included trans-fats among other nutritional standards. Thus, state policy activities restricting trans-fats were largely after trans-fats made their way onto local political agendas. Moving up toward the federal level, a national trans-fat ban was announced by the FDA in 2013, taking full effect in 2018. After 2012, we saw no further state activity on the restricting of trans-fats state-wide. On the policymaking side of this bottom-up case study, trans-fat restrictions primarily diffused upward in a temporal order: local - state - federal.

Organizationally, the number of state and local governments performing activities with regard to coronary heart disease treatment varied (Tables 5 and 6). However, despite the varying levels of government, the trends for changes made organizationally were similar across both state and local levels. Regarding cardiovascular and coronary heart disease activities, two broad findings emerge. First, local health departments are much more active in providing activities than states. However, this is not surprising given that the more local the government, the more involved they tend to be in providing services. Second, there are similar patterns between local and state government adjustments to their heart disease activities. Between the data years of 2005 and 2008, more local and state health departments began conducting these activities more directly. Interestingly, after 2008, the number of local health departments who directly performed and contracted out these activities began decreasing again back to where it was in 2005, and after 2010, the number of states providing heart disease services also returned to the number of states prior to 2010. Descriptively, this has two potential explanations: that local health initiatives held less of a lasting impact, at least structurally, than the federal HIV initiative; or that trans-fat bans were believed to be a very effective method of reducing heart disease and therefore maintaining activity on providing services was less necessary. Federally the CDC's focus on cardiovascular disease has generally been rising over the years, with a big jump between 2013 and 2016 (a difference of $106 million). This is not surprising given that the national ban would be in full swing by 2018, likely demanding research into viable trans-fat alternatives and outcomes, and federal attention to coronary heart disease was increasing, as seen in the budget changes. Consequently, heightened federal activity may have decreased local activity, as federal activity may

have made local governments feel that the issue was being addressed elsewhere, thereby freeing up space on their agendas.

As with top-down change, I cross-tabulated the data to see how policy and structural changes co-occur (Table 17). Overall, more jurisdictions passed trans-fat bans without making changes in the activities performed. This suggests that the policy innovations are not always reflected in organizational efforts, and that differences in the two dimensions of government exist. So, either policy and organizational changes do not respond to the same external stimuli (like an intervention), or whatever change happened first (whether a trans-fat restriction or a change in heart disease services provided), the other was deemed unnecessary. It is thus not surprising that the t-test revealed that the means of policy and organizational adoptions were significantly different (Table 18). As with the top-down case, this suggests that organizational change and policy change are not simultaneously adopted. How, then, do these innovation processes differ? The logit and QCA analyses below seek to inform this.

Table 17: Bottom-Up CrossTabs

Trans-Fat Restrictions Passed	**Changes in Coronary Heart Disease Treatments Performed**			**Total**
	0	**1**	**2**	
0	542	197	10	749
1	15	6	0	21
Total	557	203	10	770

Table 18: Bottom-Up T-Test

Variable	Mean	SE	SD	95% Confidence Interval
Coronary Heart Disease Activity/Service Change	0.28	0.02	0.49	0.25 – 0.32
Trans-Fat Restriction Adoption	0.03	0.01	0.18	0.02 – 0.04
Difference	-0.24	0.02	0.51	0.22 – -0.29
Ho: mean (Heart Disease Service Change – Trans-fat Restriction Adoption) = 0			**t** = 13.66	**Pr(t)** = 0.00

Logit Modelling Results.

In this first analysis for bottom-up change, I sought to understand how policy adoptions and structural/activity changes occur and how these vary over time. I find, as with the top-down case, that policy-making and organizational changes are driven by different factors. The results are presented below in Table 18.

Policy Change. Similar to the top-down case, centralization mattered for whether a trans-fat ban or restriction was adopted. Decentralized governments were significantly more likely to pass a trans-fat ban than centralized governments ($p<.05$). As with above, this is likely due to more independent governments having less complexity and lowered spans of control, enhancing the ability to be innovative. However, unlike the top-down case, need does matter in the bottom-up scenario. Governments with high rates of coronary heart disease deaths were more likely to adopt trans-fat restrictions ($p<.01$).

Regarding the role of legislative agendas, this variable was not included in the bottom-up case for two reasons. First, trans-fat restrictions were passed legislatively for the first time in 2007, so there were no previous trans-fat restrictions to account for.

Second, a legislative search showed that no jurisdictions in this sample had passed coronary heart disease policies in the recent years prior to 2007, suggesting that trans-fat restrictions were a fairly new policy idea, unlikely to have been affected by whether coronary heart disease was on the legislative agenda. Therefore, local governments may in fact be a "marketplace of ideas" (Oates, 1999), where these ideas are "tested" for efficacy and/or political acceptance (Brandeis, 1932; Kettl, 2016).[4]

Table 19: Trans-Fat Restrictions Passed

	2008
Centralization	-1.21*
Local Government	0.18
Specialization	-0.15
Coronary Deaths	0.01**
FTE	0.00
Constant	-4.71**
Observations	184

*** p<0.001, ** p<0.01, * p<0.05

Organizational Change. The second set of logit analyses conducted examined activity changes made, which in this case are changes in how coronary heart disease treatments are performed. Looking at Table 19 below, like top-down organizational change, structural factors mattered for whether activity changes were made. This was the case for policy changes, but here, a different structural variable mattered. Since the first trans-fat

[4] The results of the sensitivity analysis where the assumption regarding policy adoptions being counted for both cities and counties in the dataset was excluded can be found in Appendix A. The results largely aligned well with Table 19.

restrictions were set, there was an increase in governments both contracting out and directly performing treatments themselves (Tables 4 and 5). Structurally, those governments that performed a wider variety of public health activities were more likely to adopt coronary heart disease changes ($p<.01$), aligning with existing theory that makes a connection between specialization and innovative behavior (e.g. Kastelic, 1974; Perrow, 1970). This effect was strongest early on (2013) before tapering off.

The second factor that mattered for bottom-up organizational change was level of government. This is similar to above in that level of government mattered, but it matters in the opposite way. Whereas above, state governments were more likely to make changes to HIV screening and treatment services, in the bottom-up case, local governments were more likely. So, level of government matters, but it is mediated to an extent by direction. Level of government only mattered in this case in the early years of the trans-fat attention, aligning with the descriptive statistics in Tables 4 and 5 above. This is likely due to local governments leading the charge in combating coronary heart disease, with more states catching on in later years, potentially assessing its efficacy (Boushey, 2012; V. Ostrom, 1994). So, we see horizontal diffusion of changes made before vertical diffusion changes. This is expected is local levels are indeed "laboratories for democracy" (Brandeis, 1932).

Table 20: Coronary Heart Disease Treatments

	All Years	2010	2013	2016
Centralization	0.04	-0.07	-0.20	0.54
Local Government	1.18**	1.07*	0.86	0.73
Specialization	2.69***	3.42**	2.86*	2.09
Coronary Deaths per 100k	0.00	-0.00	0.00	0.00
FTE	-0.00	0.00	-0.00	-0.00
Constant	-3.77***	-3.70**	-3.34**	-3.38**
Observations	554	189	196	169

*** p<0.001, ** p<0.01, * p<0.05

Fs/QCA Results.

As stated above, the purpose of this final analysis for bottom-up change is to gather more nuance into policy and structural changes. Specifically, I asked the following questions: under what conditions does change occur and are these conditions the same for organizational and policy change? As with top-down change, no necessary conditions were found, only sufficient patterns of conditions.

Policy Change. As with top-down policy change, no viable trends were identified for local governments; however, different than for top-down change, no patterns were identified for state governments either. The consistency thresholds from the QCAs were too low, indicating that while we did have governments pass trans-fat restrictions, the patterns of conditions identified were not consistent enough across the organizations who did pass policies to where reliable patterns could be identified. With top-down change,

state patterns of adoption were found, but with no patterns being identified with bottom-up change. This finding speaks to the differences in top-down and bottom-up change, where the diffusion of bottom-up adoptions is more sporadic than top-down adoptions.

Organizational Change. Here, I examined the patterns of conditions that contributed to changes in how heart disease services were provided in the bottom-up case. As with above, QCA analyses were run on two fronts: overall change, where the outcome variable reflected a change in services across all years, and change as reflected in individual groups of years post-intervention. A few general findings are important to note before QCA specifics are discussed. First, there were no state patterns identified regarding changes made to how heart disease services were performed, only local patterns. Second, despite the fact that patterns existed for local levels, local governments had few similarities to organizational changes in the top-down case, meaning that the factors that lead to organizational changes vary depending on context.

Local government adoptions of organizational changes were driven by several different patterns. As seen below in Table 21, a variety of structural configurations exist that can lead to organizational/structural changes; however, the strongest pattern (unique coverage of 0.09) has a high number of per capita expenditures, has a decentralized relationship with its state government, and has a relatively high rate of coronary heart disease deaths. Across all patterns, we see no obvious patterns among conditions, suggesting that a variety of local governments with different structures and needs were adopting organizational changes. This is different than the top-down scenario where both a high need (disease rate) was present in every configuration, and, in the strongest pattern, the resources to meet that need. This likely emphasizes differences in how local

governments respond to changes originating from a different level, as with local (horizontal diffusion) change, local governments were adopting without a strong need for change or many resources to meet those needs. So, while authority may have been a factor in adopting (V. Ostrom, 1994), the QCA patterns showed that those responding to top-down initiatives were those who also had a need. Across local governments, initiatives beginning at the local level may come with more normative expectations for conformity (DiMaggio and Powell, 1983), which may be why we see need as less of a consistent presence of need.

Table 21: All Organizational Changes – Local – Bottom-Up
Intermediate Results

	Raw Coverage	Unique Coverage	Consistency
Large Expend * High Prev * Decent *	0.23	0.09	0.86
Large Expend * Large FTE * Decent	0.36	0.08	0.89
High Prev * Large FTE * Decent	0.20	0.05	0.82
Large Expend * Low Prev * Large FTE * Large Activities	0.14	0.01	0.96
Small Expend * High Prev * Small FTE * Large Activities * Cent	0.10	0.02	0.81
Solution coverage: 0.53			
Solution consistency: 0.88			

Organizational Change: By Years. Assessing patterns in individual year groups showed that for any one group of years there were fewer consistent patterns. Unlike top-down change, local governments had patterns of organizational change adoptions, but these patterns were only identified for certain years. As described above, this is due to a lack of consistent types and structures of government responding to the intervention. This is likely due to the stochasticity of more local changes, where they can be sporadic (Boushey, 2012). Among the three bottom-up groups of years (2008-2010, 2011-2013, and 2014-2016), local patterns were only consistent enough to be identified for the last group of years surveyed. The later pattern of adopters yielded the following configuration: organizational changes between 2014 and 2016 occurred for local governments in very centralized relationships with their states, performing large ranges of public health activities, have a small number of FTEs, have a small number of per capita health expenditures, and have a high rate of coronary heart disease. Ultimately, we saw above in table 21 that a variety of local governments (with varying amounts of resources, needs, and structures) were adopting with no consistent patterns. But later adopters are characterized by having very centralized structures in conjunction with the other variables. So, it could be that being in centralized relationships prohibited faster adoptions, likely due to increased complexity and span of control as suggested by Blau (1968), even though they had a need; or, it could be that these organizations, before affecting other organizations in the centralized system waited until there was more proof of efficacy of the innovations made.

Table 21a: 2014-2016 Organizational Changes – Local – Bottom-Up

Intermediate Solutions

					Raw Coverage	Unique Coverage	Consistency
Small Expend *	High Prev *	Small FTE *	Large Activities *	Centralization	0.06	0.06	0.81
Solution coverage:	0.06						
Solution consistency:	0.81						

Bottom-Up Discussion.

The descriptive, logit, and QCA analyses of the relationship between the policy-making and organizational structural components of government revealed four key findings. First, and similar to the top-down case, policy and organizational changes were driven by different factors, though a different set of factors than above: need, specialization, centralization, and level of government. However, different than the top-down case, those governments (both state and local) that had a large number of coronary heart disease deaths were more likely to pass trans-fat restrictions (policy innovations) not activity innovations. The organizational QCAs demonstrated that need was often an important condition in contributing to a structure/activity change, but not consistently until later years. This leads to the second key finding of the bottom-up case: that the factors that drive innovation vary across time and that there are differences in early compared to later adopters of organizational innovations.

Third, and also like the top-down case, state and local governments respond differently to bottom-up initiatives. This was evident in the logit models where level of government was significant for organizational change, but not policy change. The QCAs added some nuance to these findings: the bottom-up changes were only identified when they were organizational, but even still, were only identified for local governments. The lack of identifiable state QCA patterns demonstrates that the bottom-up nature of change is sporadic for both policy-making and structural change adoptions, likely growing more so as the innovation diffuses upward, and being less cohesive and predictable (Boushey, 2012).

Fourth, need emerged as an interesting factor, but in a different way than top-down. For the logit analyses, need arose as a significant effect for the first time, but only for policy change, not organizational activity changes. As Kettl (2016) claimed, policy changes are often more visible responses to an issue; thus, those organizations having a high disease prevalence were more likely to respond in this way than less visible responses like activity changes. To meet a need then, policy diffuses upward more easily than organizational changes. The QCA analyses revealed more insight into the role of need.

Unlike in the top-down case, local innovations were not as consistently driven by more than a need to adopt, with patterns including low disease prevalence or having disease prevalence be irrelevant to the outcome. For local governments, where the change initiated, the presence of a need was less important, meaning that other motivating factors were at play. These could be intergovernmental motivations, such mimesis or norms being established as suggested by DiMaggio and Powell (1983); or it could be that the influence of structure and resources that enable change are stronger factors than a need.

Overall, different than top-down cases, the bottom-up case did not bring with it an authority. Instead, the bottom-up case presented a scenario where local efforts brought not only attention to an issue, but efforts to address the issue. The findings that teased out the interwoven relationship of two key dimensions of government are illustrated below in Figure 5.

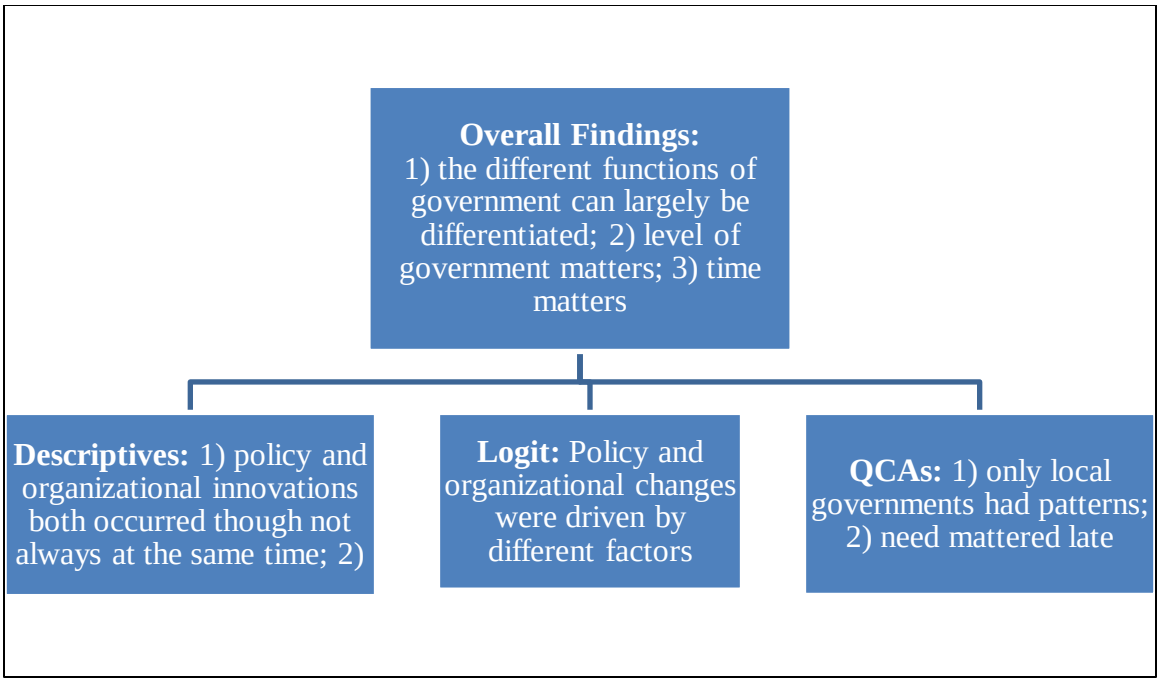

Figure 5: Bottom-Up Change Results.

CHAPTER 7: DISCUSSION.

The goal of this research was to tease out the complexities of government by understanding the relationship between two key dimensions of government - the policy-making and organizational/structural components. I did this by examining how policy and organizational changes occur, specifically testing what factors drive each form of change. So, if a government chooses to innovate, when does it choose to innovate in terms of policy and when does it choose to innovate in terms of adjusting its structure? The answer is that it depends. When the government chooses to innovate in terms of policy, the contexts and drivers of those innovation decisions are largely different than when the government the government innovates in terms of its structure. These different dimensions of government, then, are fairly distinct, at least in terms of their change processes, though not always. Thus, the extent to which they are separate is highly contingent on context; and the fact that it is contingent on context means that certain forms of innovation are at times more feasible or attractive for governments, and not necessarily both forms at a given time. Theoretically, this is important because it suggests that innovation in the public sector is both a product of what the government wants to do and what the government is able to do.

To get to this conclusion, I looked at three different phenomena: 1) if the factors that affect change in one process affect change in another, 2) if these change processes look different across levels of government, and 3) if these change processes look different over time. In sum, I found that all three (with some important caveats) were found to be true: that policy and organizational changes are driven by different factors; that how policy and organizational change differ is contingent on level of government; and that the

differences between policy and organizational changes fluctuate over time. Importantly, by testing these three phenomena, a critical caveat emerged - these relationships among the factors that drive policy and organizational changes vary depending on whether that change was top-down or bottom-up. A summary of the results is presented below in Table 22 and are elaborated upon below.

Finding 1: Driving Policy and Organizational Change.

The factors that drive policy change are not the same factors that drive organizational structural changes. Both the logit analyses and QCAs emphasized this finding. Importantly, how these dimensions of government differed varied depending on whether the change was top-down or bottom-up, and, as the QCAs showed, whether the government was an early or late adopter (to be discussed more below). As described above, this means that it is likely that different contexts and scenarios make one form of innovations more possible or attractive, and not governments having a range of innovation types to pursue.

Need. Need presented an interesting motivation for change. The presence of a need for change sometimes influenced policy and organizational change, but other times, policy and organizational change were driven by either a low relative prevalence of disease or the disease prevalence was irrelevant to the outcome. This means that innovations in government across both local and state levels were motivated by more than just a need. Thus, in vertical diffusion contexts, inter-organizational effects are present just like in horizontal diffusion contexts.

Importantly, the role of need was very contingent on context. Generally, in the QCA patterns where state and local governments were assessed separately, disease prevalence mattered in every instance of policy change. In organizational change, disease prevalence was more varied, particularly among local governments, indicating that all innovations are not driven by a need for change, but also by other factors, such as other diffusion mechanisms (e.g. norms).

Looking at state and local governments together in the logit models, the role of need was significant for policy change, but not for organizational change, but only in the bottom-up case. A key question then, is across all governments, why did need only appear in the bottom-up case and why not for organizational change? We know theoretically that organizations change and innovate for a variety of reasons (e.g. norms, mimesis, learning), particularly those in a federalist system where their efforts and goals are interwoven with those of other organizations (V. Ostrom, 1994). We also know that the nature of top-down and bottom-up change is different, as one brings a sense of authority (top-down) and the other brings opportunities for learning about salient issues and effective solutions (bottom-up) (e.g. Kettl, 2016; Sugiyama, 2011). In the bottom-up case, where diffusion is typically a result of learning from local jurisdictions, we saw where need was a significant effect. Theoretically this makes sense, as those states that had a high disease prevalence were likely those that were paying attention to states on a local level, to see if the actions taken there were effective at meeting their needs on a higher level.

Further, regarding the differences between policy and organizational change, need was likely only significant in policy change because policy changes are very visible

(Kettl, 2016). Hence, if there was a need to be met, because policymakers are elected officials and can have ulterior motives (e.g. reelection) (Kettl, 2016), adopting a very visible response to a need is likely an attractive means of meeting that need.

Interestingly, the interaction of need and context over time further emphasized differences between policy and organizational change. When the QCAs were conducted for individual groups of years, the prevalence of need contributing to change was present in the early years of policy adoptions in the top-down case, but in the later years of organizational change in the bottom-up case. This could speak to the differences in origin of change; and/or this could be a product of differences in perceived effects of the two types of innovations. For example, it could be that early adopters with a need for change are more likely to adopt policy changes, whereas later adopters with a need for change, either do not adopt organizational changes first, or the efficacy of the organizational changes take longer to diffuse than policy changes.

Finding 2: Level of Government.

Understanding the complexity of government means that level of government must be taken into account as the results of this study highlight that how the different dimensions of government relate to each other depends on the level of government being observed (RQ 6). From the logit analyses, we have two main findings. First, level of government mattered for organizational activity changes but not for policy adoptions. Second, we see that level of government mattered for organizational changes in both top-down and bottom-up cases, but in opposing ways (partially confirming RQ 6a). States were more likely to make activity/structure changes in the top-down case, and local governments were more likely to make activity/structure changes in the bottom-up case.

This has two potential explanations: 1) it could be that the level of government closest to the intervention is the one who is most likely to adopt organizational changes; or 2) it could also be that between the two types of innovations, organizational changes are the ones most contingent on level of government than policy adoptions.

The QCAs were able to shed more light on how level of government affected innovation decisions. As described above, when no patterns of innovation were found, it meant that there was no consistency of patterns and that adoption decisions were more sporadic. For local governments, no patterns were identified in the top-down case for policy adoptions. In the bottom-up case, no patterns were identified for state governments for either policy or organizational changes (confirming RQ 6b). On one hand, this does signify differences between policy and structural innovations as overall, patterns regarding policy change were overall much more sporadic. On the other hand, it also speaks to how the different levels of government react to interventions. In the top-down case, state governments and not local governments had patterns for policy adoption, likely because they are closer to the source of the intervention and had identifiable patterns for policy change, meaning that there was some organization and consistency of adopters. Both levels of government had patterns for activity/structure change. Contrarily, in the bottom-up case, local governments and not state governments had identifiable patterns for *both* policy and organizational changes, while state governments had patterns for *neither*. These differences in when patterns were identifiable and when they were not, potentially speak to the nature of how these two dimensions of government relate for the different levels of government. Local governments still had consistent and organized patterns of activity/structure adoptions in the top-down case

(even when they did not have policy changes); whereas states were not able to have any activity/structure or policy change patterns in the bottom-up case. Thus, it appears that local governments had different motivations or capabilities to change organizationally, as they still responded in this way even when they did not respond with policy adoptions. This partially confirms RQ 5a, as patterns for policy and organizational change were determined not just by direction, but also by level of government.

These results suggest that these two dimensions of government are not always related, and governments can choose whether they respond to stimuli or interventions organizationally or in terms of policy, because as seen in this case, it is not always both; and local governments opted to respond more cohesively organizationally, whereas states only did so in one scenario (the top-down case).

Finding 3: Change over Time.

Though the data did not lend to specific comparison as to whether one type of change preceded the other, we can see patterns of each over time, and are able to compare not just differences in how they operate, but in the prominence of each type of change as years pass after an intervention. Specifically, the results show that the relationship between the policy-making and more structural dimensions of government varies for early compared to late adopters. The effect of time was seen most prominently in the QCAs, as from the logit models no convergence of driving factors policy and organizational change emerged over time. From the QCAs, we can see that the processes of policy and organizational change varied over time. This finding partially confirms RQ 4 that factors that drive policy and organizational adoptions will change over time.

For example, in the top down case, only early adopters were identified (for state governments making policy and organizational changes); but in the bottom-up case, only late adopters were identified (for local governments making organizational changes). The authority that comes with a top-down initiative likely explains why we had patterns of early adopters, as the presence of pattern means there was some consistency of behavior among organizations. So, there was consistent adoptions of HIV policies in the early years after the launch of the CDC initiative, but more sporadic adoptions in later years. The learning that typically stems from bottom-up adoptions likely takes time to prove that a measure or effort is effective, likely explaining why early patterns were not identified (no consistent government efforts), but later patterns were (when there was consistency of activities). Importantly, the lack of patterns across both state and local governments makes direct comparisons of policy and organizational change more challenging; yet the findings here still suggest that the processes for each vary over time. So, the complexity of government is likely exacerbated when we think about how its dimensions relate over time.

Finding 4: Origin of Change.

In a federalist system, the nature of government is inherently interdependent and interwoven (V. Ostrom, 1994). As such, change or impetus for change can occur anywhere within that system. In this study, origin of change proved to be perhaps the most telling factor that distinguished these two dimensions of government. The logit and QCA analyses demonstrated that policy change and organizational change were driven by different factors, but the parameters in which these differences existed were mediated by the origin of the change itself. These findings strongly support RQ 5, as the factors that

differentiated policy and organizational change were different in dissimilar ways depending on whether the intervention was top-down or bottom-up. So, for understanding government better, it is not as simple as saying there is a difference between two different processes of change; rather, as Svara (2008) discussed, research ought to better define the parameters of the relationship between the different dimensions of government; and these results suggest that looking at top-down and bottom-up contexts when talking about government and its complexity is crucial.

Table 22: Results Summary

Research Questions	Results
RQ 1: Will structural components will matter more for organizational change than policy change?	**No.** Centralization mattered for both policy and organizational changes, and other factors like FTE mattered for policy adoptions.
RQ 1a: Will organizational change, more than policy change, be driven by highly specialized organizations?	**Context Dependent.** The effect of specialization was significant but only in the bottom-up case.
RQ 1b: Will fs/QCA patterns will consistently include decentralized organizations as a contributing factor to change?	**Context Dependent.** The effect of centralization was contingent on level of government and diffusion direction. Decentralization was a consistent factor, more so than centralization, but centralization often contributed to innovative behavior.
RQ 1c: Will those jurisdictions with existing efforts in the health issue in question be more likely to adopt a relevant policy and organizational change post intervention?	**Context Dependent.** The agenda of governments was significant only for top-down organizational change.

Table 22: Continued

RQ 1d: Will policy and organizational change both be more likely in less centralized vertical relationships?	**Yes.** Decentralization was a significant factor in both top-down organizational changes and bottom-up policy adoptions.
RQ 1e: Will policy and organizational change both be more dependent on large amounts of resources (FTEs)?	**Context Dependent.** Resources were a significant factor for top-down policy change, but among the QCAs, the presence of resources was dispersed across different contexts.
RQ 2: Will external components, like having a need for change, matter more for policy change than organizational change?	**Context Dependent.** Need was a significant factor for whether a trans-fat restriction was adopted but not HIV policies.
RQ 3: Will policy and organizational changes be driven by different motivations to change/innovate?	**Yes.** The effects of certain factors like a need for change, legislative agenda, and level of government differentiated policy and organizational adoptions.
RQ 4: Will the factors that drive adoption for policy and organizational change vary over time?	**Context Dependent.** The effects that drove policy and organizational change fluctuated over time; however, for local governments, some similarities exist between early adopters of policy and organizational change, indicating that early adopters may be motivated in similar ways regardless of the type of innovation.

Table 22: Continued

RQ 5: Will the factors that drive policy and organizational change vary based on diffusion direction?	**Yes.** While there were few differences from the Logit analyses in the factors that drove adoptions of policy and organizational changes, the patterns identified in the QCA analyses demonstrated differences in the conditions that enable policy and organizational change.
RQ 5a: Will the fs/QCA patterns regarding policy change will be stronger for top-down change (patterns with higher unique coverages), while patterns regarding organizational change be stronger for bottom-up change (patterns with higher unique coverages)?	**Context Dependent.** Patterns of policy change were not necessarily stronger, but were identified more easily for state governments than for local governments for both top-down and policy change.
RQ 6: Will level of government be matter for whether the change is a policy or organizational change?	**Yes.** Level of government was only significant in one logit model, but in the QCAs, state patterns were more easily identified for both policy **and** organizational change and these patterns differed from those of local governments.
RQ 6a: Will local level governments be more likely to make organizational changes, while state governments are more likely to make policy changes?	**Context Dependent.** Level of government was only significant for bottom-up organizational changes, but state governments were more likely to make top-down organizational changes.
RQ 6b: Will fs/QCA patterns regarding policy change be stronger for states (patterns with higher unique coverages), while fs/QCA patterns for administration services change be stronger (patterns with higher unique coverages) for local governments?	**Context Dependent.** While QCA findings did reveal that in the top-down case no local patterns of policy adoptions existed (only state patterns), policy and organizational changes patterns were identified for the bottom-up case for local governments only.

Conclusion.

Government is complex. It has different functions that can be broadly described as falling into one of two categories: politics and administration (Wilson, 1887). Yet, as decades of research have established, these two categories are far from being isolated parts of government (e.g. Overeem, 2008; Svara, 2014). The debate on the extent to which these are embedded presents to us the idea that we have broad dimensions of government without much understanding as to how the different dimensions of government are similar or dissimilar. Looking at two primary dimensions of government, I examined how the change processes of policy adoptions and structural/organizational changes are related. In other words, when government chooses to innovate, what factors lead to a policy innovation compared to a structural innovation?

With the results largely suggesting that these two dimensions of government distinct because they are driven by different factors, we have two broad, overarching conclusions. First, the broad dimensions of government are on some foundational level different from each other. While there was an instance of where policy-making and structural change processes aligned, this research largely pointed to the fact that these two dimensions of government are driven by different factors. If these dimensions were similar, then we would expect to see the processes of change be similar to each other. This would indicate that there is somewhat of a flow from one change to another, without having to have different sets of resources or contexts; but this is not what we find.

A critical caveat to this conclusion is that how policy-making and structural change processes occur depends a lot of context, such as bottom-up and top-down scenarios and level of government. Such findings beg the question of whether the

differences between these two dimensions of government are driven by a true difference in processes between the two or if the role of context is that strong, specifically with regard to the level of government and diffusion direction as described above. Because of this, any future studies examining the dichotomy must specify and understand the level of government and origin of change. Especially given that so many of the issues our government tackles, like health, are not bound to one jurisdiction, these two broad functions of government need to be studied in multilevel systems, as the interplay may not be limited to just one level.

Second, the findings suggest that change is not just change. Theoretically, when we talk about how and why organizations change, we need to be explicit about what kind of change, recognizing that advancing knowledge on the motivations and drivers of change does not apply to any and all forms of change. This is similar to some scholarship that has differentiated among types of innovations, for example, technological vs. administrative innovations (Damanpour, 2004; Kimberley and Evanisko, 1981); but the findings of research takes this a step further by arguing that it is not just type of innovation in terms of function, but rather type of innovation in terms of what part of government is innovating. These results underscore that governments do not always innovate in multiple ways, such as by both policy and structurally; and sometimes, in different contexts, one is more preferable and/or feasible than the other.

This research makes significant headway in parsing out some of the complexities of government by helping us understand not only how the different dimensions of government relate, but the parameters of that relationship. The factors that drive innovation in terms of policymaking are different than those that drive innovative

behavior in terms of the organization's structure; but, finding a case where those factors identical means that there are instances were a government may be able to innovate in either way or both. This ultimately indicates that a government does not merely innovate, but *how* it innovates depends on what factors are at play. This allows us better understand how government works because it begins to differentiate its different dimensions beyond just function, and more based on how they relate and work together. Future studies should further tease out this decision-making process.

Second, and related to the first, this research furthers what we know on policy and organizational change, especially with regard to diffusion. While we know a lot about vertical diffusion, the vast majority of this literature is centered on policy implementation. By applying this foundation to how we think about policy adoption diffusion and organizational change diffusion (isomorphism) across levels, we learned that level of government matters and those long-established mechanisms of change as identified by Berry and Berry (e.g. 1990) and DiMaggio and Powell (e.g. 1983) vary both over time and across levels of government.

In sum, the different dimensions of government is an "inevitable" balancing act between policy-makers and administrators, the two most central groups of individuals in public administration (Tahmasebi and Musavi, 2011; Waldo, 1987). Thus, understanding the relationship between the two is important to our identity as public administration scholars (Svara, 2008), as it affects how we define the various facets of government. We need to know how they are similar, how they are different, and how they work together (if at all) for not just theoretical purposes, but to practically guide the normative relationships.

Limitations and Future Directions. As with all studies, this study has its limitations. Multiple limitations exist. First, the nature of the analysis requires a manipulation of variable coding. This poses a risk of losing data by having to recode and reframe certain variables. Second, across the fs/QCA results, coverage scores were not very high, indicating other viable patterns may exist that were not observed in the data. Third, the organizational data were from surveys implemented every 3-4 years, with changes in what variables were included and how they were measured. This had three consequences: 1) it led to some variables needing to be excluded from analysis (like expenditures on a state level) because they were not in the survey; it meant that some administration changes, like FTE allocations and finding allocations could not be tracked over time, so only organizational activity changes were used as a proxy for administration; and 3), the periodic survey implementation means that the closest estimation to when an organizational change occurred was at the time of the survey, not offering us a chance to see the exact year a change was made. Thus, a direct temporal comparison of when an organizational change and when a policy was adopted was not feasible. Fourth, it is recognized that policy-making functions exist beyond just ordinances. Original manual data collection ensued regarding changes in policy, implementation, and regulations. However, collection of regulations and changes in implementation proved difficult as it relied on the responsiveness of government staff and/or the availability of the information on government websites. The inconsistent findings of each locale led to the conclusion that an accurate picture of regulation and implementation pictures was not obtained and therefore led to their exclusion from being considered as a policy-making activity.

Regarding future directions, the findings of this paper beg additional questions. First, because the nature of this data did not lend itself to establishing temporal order, additional studies, likely a case study approach ought to further tease out the relationship between the policy-making and structural dimensions, by determining which process follows the other. Second, the results of this study emphasized that the factors that drove policy and organizational change varied over time. Future studies need to look at this sequence of change to not only help us understand the complexity of government, but to also deepen the literature on how which diffusion mechanisms motivate change as time passes. Third, the QCAs demonstrated that change can be made when there is not a need (e.g. having a low HIV prevalence). Future studies need to further examine those entities with strong needs for change compared to those who do not to see how their motivations, goals, and efforts vary.

APPENDIX A: SENSITIVITY ANALYSES

Table A1: HIV Policies Passed
Zero Inflated Comparison

	Negative Binomial All Years	Logit All Years
Centralization	-1.02**	-0.63*
Local Government	0.14	-0.40
Specialization	-1.24	-0.31
HIV Diagnoses	0.00	0.00
FTE	0.00	0.00**
Per Capita Expenditures	0.01	0.00
Policies Passed Pre-Intervention	2.32***	1.10
Constant	-2.50**	-2.12*
Observations	299	308

*** p<0.001, ** p<0.01, * p<0.05

Table A2: Trans-Fat Restrictions Passed
Zero Inflated Comparison

	Poisson 2008	Logit 2008
Centralization	-1.04	-1.21
Local Government	0.13	0.18
Specialization	-0.15	-0.15
Coronary Deaths	0.01**	0.01**
FTE	0.00	0.00
Constant	-4.21***	-4.71***
Observations	184	184

*** p<0.001, ** p<0.01, * p<0.05

Table A3: HIV Policies Passed
Sensitivity Analysis

	All Years Original	All Years Sensitivity	2013 Original	2013 Sensitivity	2016 Original	2016 Sensitivity
Central	-0.63*	-0.78*	-0.23	-0.34	-2.08**	-4.35**
Local	-0.40	-1.71*	-1.09	-2.40**	0.41	-1.39
Special	-0.31	-1.61	-1.46	-2.48	2.43	1.07
HIV Prev	0.00	0.01	0.01	0.01	0.02	0.06
FTE	0.00**	0.00***	0.00*	0.00*	0.00*	0.00**
Per Cap	0.00	0.00	0.01	0.00	-0.00	-0.00
PrePolicies	1.10	0.67	1.03	0.71	1.52	0.84
Constant	-2.12*	-1.34	-1.06	-0.39	-4.37*	-3.71*
Obs	308	308	170	170	138	138

*** p<0.001, ** p<0.01, * p<0.05

Table A4: Trans-Fat Restrictions Passed
Sensitivity Analysis

	2008 Original	2008 Sensitivity
Centralization	-1.21*	-1.31
Local Government	0.18	-0.23
Specialization	-0.15	0.96
Coronary Deaths	0.01**	0.01*
FTE	0.00	0.00
Constant	-4.71**	-4.25**
Observations	184	184

*** p<0.001, ** p<0.01, * p<0.05

APPENDIX B: TOP-DOWN TRUTH TABLES

Table B1: Truth Table
Local Policy Changes All Years

LHD	All HIV Policies	FTE	Special	Central	HIV Per 100k	Per Capita Expend
1	0	0	0.39	0.5		1
2	0	.	0.53	0.5	0	0
3	0	.	0.47	0	0	1
4	0	1	0.41	0.5	1	1
5	1	.	0.62	0	1	0
6	0	1	0.61	0	1	1
7	0	0	0.11	0.5	0	0
8	0	1	0.51	0	1	1
9	0	0	0.58	0	0	0
10		0	0.74	0	1	0
11	0	0	0.42	0	0	0
12	0	0	0.52	0.5	0	0
13	0	1	0.45	0	1	1
14	0	.	0.60	0	0	0
15	0	1	0.55	0	1	0
16	0	1	0.42	0	1	0
17	0	0	0.15	0.5	1	0
18	0	1	0.65	0	1	1
19	0	0	0.58	0	1	0
20	1	1	0.40	0	1	0
21	0	.	0.54	0	1	0
22	0	0	0.34	0	0	0
23	0	.		0.5	1	0
24	0	.	0.60	0	1	0
25	0	0	0.35	0	1	0
26	0	0	0.36	0.5	0	0
27	1	0	0.40	0	1	0
28	0	0	0.35	0	1	1
29	0	1	0.52	0	0	0
30	0	0	0.71	0	0	0
31	0	.	0.42	0	0	0
32	0	.	0.34	0	0	1
33	0	0	0.47	0	0	0
34	0	.	0.36	0.5	1	0
35	0	.	0.31	0	0	0

Table B1: Continued

36	0	0	0.09	0	1	0
37	0	1	0.54	0.5	0	1
38	0	0	0.49	1	1	0
39		1	0.54	1	1	0
40	0	1	0.68	1	1	1
41	0	1	0.54	1	1	0
42	0	1	0.49	1	1	0
43	0	1	0.67	1	1	0
44	0	1	0.60	1	1	0
45	0	1	0.60	1	1	1
46	0	0	0.53	1	0	0
47	0	1	0.56	1	1	1
48	0	1	0.62	1	1	1
49	0	0	0.61	1	1	0
50	0	0	0.39	1	1	0
51	0	0	0.21	0.5	1	1
52	0	0	0.52	0	1	0
53	0	1	0.44	0	1	1
54	0	0	0.51	0	0	0
55	1	1	0.38		1	1
56	0	1	0.64	0	1	1
57		0	0.40	0	1	0
58	0	1	0.48	0.5	1	0
59	0	1	0.55	0	1	1
60	0	1	0.59	0.5	1	1
61	0	0	0.11	0	1	0
62	0	.	0.62	0.5	1	1
63	0	0	0.55	0	0	0
64	0	0	0.52	0	0	0
65	0	0	0.31	0	0	0
66	1	0	0.44	0	1	1
67	0	0	0.65	0	0	1
68	0	0	0.54	0.5	1	1
69	0	1	0.76	0	0	0
70	0	.	0.45	0	1	1
71	0	1	0.62	0	1	1
72	0	.	0.59	0	1	0
73	0	.	0.49	1	0	0
74	0	0	0.54	0	0	0
75	0	1	0.33	0	1	0
76	0	0	0.79	0		0
77	0	1	0.59	0	1	1

Table B1: Continued

78	0	.	0.51	0.5	1	1
79		0	0.68	0	1	0
80	0	1	0.26	1	1	0
81	0	0	0.51	0	1	1
82	0	0	0.21	0	1	1
83	0	1	0.76	0.5	1	1
84	0	1	0.44	0	0	1
85	0	1	0.87	0	0	1
86	0	0	0.44	0.5	0	0
87	0	1	0.06	0	1	0
88	0	0	0.11	0.5	0	0
89	1	1	0.66	0	1	1
90	0	0	0.27	0.5	0	0
91	0	1	0.62	0	0	1
92	0	1	0.60	0	0	0
93	0	1	0.42	0	0	1
94	0	0	0.41	0.5	0	0
95	0	0	0.25	0.5	0	0
96	0	0	0.64	0	0	0
97	0	.	0.64	0	0	1
98	1	0	0.28	0.5	0	0
99	0	1	0.46	0	0	0
100	0	1	0.54	0	0	0
101	0	.	0.61	0	0	1
102	0	1	0.54	0.5	1	0
103	0	.	0.58	0	0	1
104	0	0	0.69	0.5	1	0
105	1	0	0.40	0.5	1	0
106	0	0	0.34	0.5	0	0
107	0	0	0.42	0.5	0	0
108	0	1	0.62	0	1	0
109	0	0	0.46	0	1	0
110	0	1	0.54	1	0	0
111	1	.	0.58	0.5	1	0
112	0	1	0.53	0	0	0
113	0	0	0.39	0	0	0
114	0	0	0.21	0	0	0
115	0	1	0.66	0	1	1
116	0	.	0.55	0.5	0	0
117	0	0	0.54	0	0	0
118	1	1	0.72	0	1	1
119	0	.	0.26	1	1	0

Table B1: Continued

120	0	0	0.45	1	0	0
121	0	1	0.60	0	1	1
122	0	1	0.36	0	1	1
123	0	0	0.31	0	1	0
124	0	1	0.64	0	0	0
125	0	1	0.45	0.5	1	0
126	0	.	0.46	0	0	1
127	0	0	0.35	0	0	0
128	0	1	0.54	0	0	1
129	1	.	0.32	0		1
130	0	0	0.26	0	0	0
131	0	1	0.62	0.5	1	1
132	0	0	0.54	0	0	0
133	0	1	0.45	0	0	1
134	0	1	0.29	0	0	1
135	0	0	0.36	0.5	0	0
136	0	0	0.14	0.5	1	0
137	0	1	0.15	0.5	1	0
138	0	0	0.21	0.5	0	0
139	0	0	0.31	0	0	0
140	0	1	0.88	0	1	1
141	0	.	0.60	0	0	1
142	0	0	0.71	0	0	1
143	0	1	0.91	0	0	1
144	0	0	0.78	0		1
145	0	1	0.54	0	0	0
146	0	1	0.40	0.5	1	0
147	0	1	0.59	0	0	0
148	1	1	0.58	0	0	1
149	0	1	0.53	0.5	0	1
150	0	1	0.58	1	0	0
151		0	0.62	0	0	1
152	1	1	0.31	0	0	0
153	0	1	0.74	0	1	1
154	0	0	0.48	0	0	0
155	0	0	0.51	0.5	0	1
156	0	0	0.75	0	1	0
157	0	0	0.59	0	0	0
158	0	1	0.56	0	0	1
159	0	0	0.40	0.5	0	0

Table B1a: Truth Table
Local Policy Changes 2010-2013

LHD	Policy Changes	Special	Central	FTE	HIV Per 100k	Per Capita Expend
1	0	0.08	0	1	1	1
2	0	0.55	0.5	1	0	0
3	0	0.56	0	1	0	1
4	0	0.39	0.5	1	1	1
5	0	0.66	0	1	1	1
6	0	0.51	0	1	1	1
7	0	0.20	0.5	0	0	0
8	0	0.53	0	1	1	1
9	0	0.56	1	1	0	1
10		0.44	1	1	1	0
11	0	0.40	0.5	0	0	0
12	0	0.47	0	0	0	0
13		0.71	0	0	1	0
14	0	0.32	0.5	0	1	0
15	0	0.39	0	0	0	0
16	0	0.45	0.5	0	0	0
17	0	0.54	0	1	1	1
18	0	0.31	0.5	0	1	0
19	0	0.43	0	0	0	0
20	0	0.16	0.5	0	0	0
21	0	0.62	0	1	1	1
22	0	0.57	0	1	0	1
23	1	0.31	0	1	1	0
24	0	0.64	0	0	1	0
25	0	0.33	0	0	0	0
26	0	0.20	0	0	0	0
27	0	0.37	0.5	0	0	0
28	0	0.55	0	1	1	1
29	0		0	0	1	1
30	0	0.57	0	1	1	1
31	0	0.46	0	1	1	1
32	0	0.43	0	1	0	0
33	0	0.62	0	1	1	1
34	0	0.57	0	1	0	0
35	0	0.56	0	1	1	0
36	0	0.53	0	1	1	1
37	0	0.30	0	0	0	1
38	0	0.59	0	1	0	1

Table B1a: Continued

39	0	0.62	1	1	1	1
40	0	0.47	0	0	0	
41	0	0.49	0	1	0	1
42	0	0.05	0	0	1	0
43	0	0.46	0.5	1	0	1
44	0	0.53	1	1	1	0
45	0	0.51	1	1	1	1
46	0	0.25	0.5	0	0	0
47	0	0.48	0	1	0	1
48	0	0.47	0	0	0	1
49	1	0.11		1	1	1
50	0	0.51	0	1	1	1
51		0.41	0	0	1	0
52	0	0.34	0.5	1	1	0
53	0	0.55	0	0	1	1
54	0	0.55	1	1	1	1
55	0	0.64	0.5	1	1	1
56	0	0.11	0	0	1	0
57	0	0.53	0	0	0	0
58	0	0.64	0.5	1	1	1
59	0	0.48	0	0	0	0
60		0.31	0	0	0	
61	1	0.46	0	0	1	
62	0	0.62	0	0	0	1
63	0	0.57	0	1	1	1
64	0	0.47	0.5	0	0	1
65	0	0.76	0	1	0	1
66	0	0.39	1	0	1	0
67	0	0.52	0	0	1	1
68	0	0.62	0	1	1	1
69	0	0.44	0	1	1	1
70	0	0.61	0	0	0	0
71	0	0.51	0	0	0	1
72	0	0.32	0	1	1	0
73	0	0.76	0	1	1	1
74	0	0.52	0	1	1	1
75	0	0.56	0.5	1	0	1
76	0	0.53	0.5	1	1	1
77		0.64	0	0	1	0
78	0	0.43	0	0	1	1
79	0	0.36	0	0	0	1
80	0	0.68	0	0	0	

Table B1a: Continued

81	0	0.44	0.5	0	0	0
82	0	0.34	0	1	1	1
83	0	0.47	0	0	0	
84	0	0.61	0	1	1	1
85	0	0.38	0	0	0	1
86	0	0.17	0.5	0	0	
87	0	0.60	0	1	0	1
88	0	0.31	0.5	0	0	0
89	0	0.40	0.5	0	0	0
90	0	0.21	0.5	0	0	0
91	0	0.60	0	1	0	1
92	0	0.61	0	0	0	1
93	0	0.52	0.5	0	1	
94	0	0.51	0	1	0	1
95	0	0.54	0	1	0	1
96	0	0.70	1	1	1	1
97	0	0.46	1	0	0	0
98	0	0.56	0	0	1	
99	1	0.68	0.5	1	1	1
100	0	0.01	0	0	0	
101	0	0.66	1	1	1	1
102	0	0.64	1	1	1	1
103	0	0.23	0	0	0	0
104	0	0.74	0	1	1	1
105	0	0.59	0.5	0	0	0
106	0	0.53	0	1	1	
107	0	0.51	1	0	1	0
108	0	0.53	1	0	0	0
109	0	0.59	0	1	1	1
110	0	0.54	0.5	0	1	
111	0	0.51	1	0	0	0
112	0	0.22	0.5	0	1	
113	0	0.40	1	0	0	0
114	0	0.38	0.5	0	0	
115	0	0.57	1	1	1	
116	0	0.49	0.5	0	1	
117	0	0.47	0.5	0	0	1
118	0	0.46	0	1	0	1
119	0	0.31	0	0	1	0
120	0	0.16	0	1	0	0
121	0	0.49	0.5	1	1	
122	0	0.64	0	0	0	1

Table B1a: Continued

123	1	0.87	0	1	1	1
124	0	0.33	0	0	1	1
125	0	0.17	0	1	0	1
126	0	0.45	0	0	0	
127	0	0.54	1	0	1	0
128	0	0.37	0	0	0	
129	0	0.52	0	1	0	1
130	0	0.37	0.5	0	0	0
131	0	0.44	0.5	0	1	0
132	0	0.61	0.5	1	1	1
133	0	0.20	0.5	0	0	0
134	0	0.45	0	0	0	1
135	0	0.55	0	1	1	1
136	0	0.46	0	1	0	
137	0	0.38	0	0	0	
138	0	0.85	0	1	0	1
139	0	0.55	0	0	0	1
140	0	0.56	0	1	0	1
141	0	0.47	0.5	1	1	0
142	0	0.71	0	0	0	0
143	0	0.53	0	1	0	0
144	0	0.68	0	1	0	1
145	0	0.47	0.5	1	1	
146	0	0.01	0	0	1	
147		0.63	0	0	0	1
148	1	0.34	0	1	0	1
149		0.51	0.5	0	0	0
150	0	0.49	1	1	1	1
151	0	0.74	0	1	1	1
152	0	0.44	0	0	0	0
153	0	0.53	0.5	0	0	1
154	0	0.51	0	0	1	0
155	0	0.62	0	1	1	1
156	0	0.53	0	1	0	
157	0	0.37	0.5	0	0	0

Table B1b: Truth Table
Local Policy Changes 2014-2016

LHD	Policy Changes	FTE	HIV Per 100k	Special	Central	Per Capita Expend
1	0	0		0.39	0.5	1
2	0		0	0.53	0.5	0
3	0		0	0.47	0	1
4	0	1	1	0.41	0.5	1
5	1		1	0.62	0	0
6	0	1	1	0.61	0	1
7	0	0	0	0.11	0.5	0
8	0	1	1	0.51	0	1
9	0	0	0	0.58	0	0
10		0	1	0.74	0	0
11	0	0	0	0.42	0	0
12	0	0	0	0.52	0.5	0
13	0	1	1	0.45	0	1
14	0		0	0.60	0	0
15	0	1	1	0.55	0	0
16	0	1	1	0.42	0	0
17	0	0	1	0.15	0.5	0
18	0	1	1	0.65	0	1
19	0	0	1	0.58	0	0
20	0	1	1	0.40	0	0
21	0		1	0.54	0	0
22	0	0	0	0.34	0	0
23	0		1		0.5	0
24	0		1	0.60	0	0
25	0	0		0.35	0	0
26	0	0	0	0.36	0.5	0
27	1	0	1	0.40	0	0
28	0	0	1	0.35	0	1
29	0	1	0	0.52	0	0
30	0	0	0	0.71	0	0
31	0		0	0.42	0	0
32	0		0	0.34	0	1
33	0	0	0	0.47	0	0
34	0		1	0.36	0.5	0
35	0		0	0.31	0	0
36	0	0	1	0.09	0	0
37	0	1	0	0.54	0.5	1

Table B1b: Continued

38	0	0	1	0.49	1	0
39		1	1	0.54	1	0
40	0	1	1	0.68	1	1
41	0	1	1	0.54	1	0
42	0	1	1	0.49	1	0
43	0	1	1	0.67	1	0
44	0	1	1	0.60	1	0
45	0	1	1	0.60	1	1
46	0	0	0	0.53	1	0
47	0	1	1	0.56	1	1
48	0	1	1	0.62	1	1
49	0	0	1	0.61	1	0
50	0	0	1	0.39	1	0
51	0	0	1	0.21	0.5	1
52	0	0	1	0.52	0	0
53	0	1	1	0.44	0	1
54	0	0	0	0.51	0	0
55	0	1		0.38		1
56	0	1	1	0.64	0	1
57		0	1	0.40	0	0
58	0	1	1	0.48	0.5	0
59	0	1	1	0.55	0	1
60	0	1	1	0.59	0.5	1
61	0	0	1	0.11	0	0
62	0		1	0.62	0.5	1
63	0	0	0	0.55	0	0
64	0	0	0	0.52	0	0
65	0	0	0	0.31	0	0
66	25	0	1	0.44	0	1
67	0	0	0	0.65	0	1
68	0	0	1	0.54	0.5	1
69	0	1	0	0.76	0	0
70	0		1	0.45	0	1
71	0	1	1	0.62	0	1
72	0		1	0.59	0	0
73	0		0	0.49	1	0
74	0	0	0	0.54	0	0
75	0	1	1	0.33	0	0
76	0	0		0.79	0	0
77	0	1	1	0.59	0	1
78	0		1	0.51	0.5	1
79		0	1	0.68	0	0

Table B1b: Continued

80	0	1	1	0.26	1	0
81	0	0	1	0.51	0	1
82	0	0	1	0.21	0	1
83	0	1	1	0.76	0.5	1
84	0	1	0	0.44	0	1
85	0	1	0	0.87	0	1
86	0	0	0	0.44	0.5	0
87	0	1	1	0.06	0	0
88	0	0	0	0.11	0.5	0
89	0	1	1	0.66	0	1
90	0	0	0	0.27	0.5	0
91	0	1	0	0.62	0	1
92	0	1	0	0.60	0	0
93	0	1	0	0.42	0	1
94	0	0	0	0.41	0.5	0
95	0	0	0	0.25	0.5	0
96	0	0	0	0.64	0	0
97	0		0	0.64	0	1
98	0	0	0	0.28	0.5	0
99	0	1	0	0.46	0	0
100	0	1	0	0.54	0	0
101	0		0	0.61	0	1
102	0	1	1	0.54	0.5	0
103	0		0	0.58	0	1
104	0	0	1	0.69	0.5	0
105	0	0	1	0.40	0.5	0
106	0	0	0	0.34	0.5	0
107	0	0	0	0.42	0.5	0
108	0	1	1	0.62	0	0
109	0	0	1	0.46	0	0
110	0	1	0	0.54	1	0
111	0		1	0.58	0.5	0
112	0	1	0	0.53	0	0
113	0	0	0	0.39	0	0
114	0	0	0	0.21	0	0
115	0	1	1	0.66	0	1
116	0		0	0.55	0.5	0
117	0	0	0	0.54	0	0
118	0	1	1	0.72	0	1
119	0		1	0.26	1	0
120	0	0	0	0.45	1	0
121	0	1	1	0.60	0	1

Table B1b: Continued

122	0	1	1	0.36	0	1
123	0	0	1	0.31	0	0
124	0	1	0	0.64	0	0
125	0	1	1	0.45	0.5	0
126	0		0	0.46	0	1
127	0	0	0	0.35	0	0
128	0	1	0	0.54	0	1
129	1			0.32	0	1
130	0	0	0	0.26	0	0
131	0	1	1	0.62	0.5	1
132	0	0	0	0.54	0	0
133	0	1	0	0.45	0	1
134	0	1	0	0.29	0	1
135	0	0	0	0.36	0.5	0
136	0	0	1	0.14	0.5	0
137	0	1	1	0.15	0.5	0
138	0	0	0	0.21	0.5	0
139	0	0	0	0.31	0	0
140	0	1	1	0.88	0	1
141	0		0	0.60	0	1
142	0	0	0	0.71	0	1
143	0	1	0	0.91	0	1
144	0	0		0.78	0	1
145	0	1	0	0.54	0	0
146	0	1	1	0.40	0.5	0
147	0	1	0	0.59	0	0
148	1	1	0	0.58	0	1
149	0	1	0	0.53	0.5	1
150	0	1	0	0.58	1	0
151		0	0	0.62	0	1
152	0	1	0	0.31	0	0
153	0	1	1	0.74	0	1
154	0	0	0	0.48	0	0
155	0	0	0	0.51	0.5	1
156	0	0	1	0.75	0	0
157	0	0	0	0.59	0	0
158	0	1	0	0.56	0	1
159	0	0	0	0.4	0.5	0

Table B2: Truth Table
Local Organizational Changes All Years

LHD	Overall Change	FTE	Special	Central	HIV Per 100k	Per Capita Expend
1	0	0	0.39	0.5		1
2	1		0.53	0.5	0	0
3	1		0.47	0	0	1
4	0	1	0.41	0.5	1	1
5	1		0.62	0	1	0
6	1	1	0.61	0	1	1
7	0	0	0.11	0.5	0	0
8	1	1	0.51	0	1	1
9	1	0	0.58	0	0	0
10	1	0	0.74	0	1	0
11	0	0	0.42	0	0	0
12	0	0	0.52	0.5	0	0
13	1	1	0.45	0	1	1
14	0		0.60	0	0	0
15	0	1	0.55	0	1	0
16	1	1	0.42	0	1	0
17	1	0	0.15	0.5	1	0
18	1	1	0.65	0	1	1
19	0	0	0.58	0	1	0
20	0	1	0.40	0	1	0
21	0		0.54	0	1	0
22	0	0	0.34	0	0	0
23	0			0.5	1	0
24	0		0.60	0	1	0
25	1	0	0.35	0		0
26	1	0	0.36	0.5	0	0
27	1	0	0.40	0	1	0
28	1	0	0.35	0	1	1
29	0	1	0.52	0	0	0
30	1	0	0.71	0	0	0
31	1		0.42	0	0	0
32	1		0.34	0	0	1
33	0	0	0.47	0	0	0
34	1		0.36	0.5	1	0
35	0		0.31	0	0	0
36	1	0	0.09	0	1	0
37	1	1	0.54	0.5	0	1
38	0	0	0.49	1	1	0
39	1	1	0.54	1	1	0

Table B2: Continued

40	0	1	0.68	1	1	1
41	1	1	0.54	1	1	0
42	1	1	0.49	1	1	0
43	0	1	0.67	1	1	0
44	1	1	0.60	1	1	0
45	0	1	0.60	1	1	1
46	1	0	0.53	1	0	0
47	1	1	0.56	1	1	1
48	1	1	0.62	1	1	1
49	0	0	0.61	1	1	0
50	0	0	0.39	1	1	0
51	0	0	0.21	0.5	1	1
52	0	0	0.52	0	1	0
53	1	1	0.44	0	1	1
54	1	0	0.51	0	0	0
55	1	1	0.38			1
56	1	1	0.64	0	1	1
57	1	0	0.40	0	1	0
58	1	1	0.48	0.5	1	0
59	1	1	0.55	0	1	1
60	1	1	0.59	0.5	1	1
61	0	0	0.11	0	1	0
62	0		0.62	0.5	1	1
63	0	0	0.55	0	0	0
64	0	0	0.52	0	0	0
65	1	0	0.31	0	0	0
66	0	0	0.44	0	1	1
67	1	0	0.65	0	0	1
68	0	0	0.54	0.5	1	1
69	0	1	0.76	0	0	0
70	1		0.45	0	1	1
71	1	1	0.62	0	1	1
72	1		0.59	0	1	0
73	0		0.49	1	0	0
74	1	0	0.54	0	0	0
75	0	1	0.33	0	1	0
76	1	0	0.79	0		0
77	1	1	0.59	0	1	1
78	0		0.51	0.5	1	1
79	1	0	0.68	0	1	0
80	0	1	0.26	1	1	0
81	1	0	0.51	0	1	1

Table B2: Continued

82	0	0	0.21	0	1	1
83	0	1	0.76	0.5	1	1
84	1	1	0.44	0	0	1
85	1	1	0.87	0	0	1
86	0	0	0.44	0.5	0	0
87	0	1	0.06	0	1	0
88	0	0	0.11	0.5	0	0
89	1	1	0.66	0	1	1
90	1	0	0.27	0.5	0	0
91	1	1	0.62	0	0	1
92	0	1	0.60	0	0	0
93	0	1	0.42	0	0	1
94	1	0	0.41	0.5	0	0
95	1	0	0.25	0.5	0	0
96	0	0	0.64	0	0	0
97	0		0.64	0	0	1
98	1	0	0.28	0.5	0	0
99	0	1	0.46	0	0	0
100	0	1	0.54	0	0	0
101	0		0.61	0	0	1
102	1	1	0.54	0.5	1	0
103	1		0.58	0	0	1
104	1	0	0.69	0.5	1	0
105	0	0	0.40	0.5	1	0
106	0	0	0.34	0.5	0	0
107	1	0	0.42	0.5	0	0
108	0	1	0.62	0	1	0
109	0	0	0.46	0	1	0
110	0	1	0.54	1	0	0
111	0		0.58	0.5	1	0
112	0	1	0.53	0	0	0
113	0	0	0.39	0	0	0
114	0	0	0.21	0	0	0
115	1	1	0.66	0	1	1
116	0		0.55	0.5	0	0
117	1	0	0.54	0	0	0
118	1	1	0.72	0	1	1
119	0		0.26	1	1	0
120	0	0	0.45	1	0	0
121	1	1	0.60	0	1	1
122	1	1	0.36	0	1	1
123	1	0	0.31	0	1	0

Table B2: Continued

124	0	1	0.64	0	0	0
125	1	1	0.45	0.5	1	0
126	0		0.46	0	0	1
127	0	0	0.35	0	0	0
128	0	1	0.54	0	0	1
129	1		0.32	0		1
130	1	0	0.26	0	0	0
131	1	1	0.62	0.5	1	1
132	1	0	0.54	0	0	0
133	1	1	0.45	0	0	1
134	0	1	0.29	0	0	1
135	1	0	0.36	0.5	0	0
136	1	0	0.14	0.5	1	0
137	1	1	0.15	0.5	1	0
138	1	0	0.21	0.5	0	0
139	0	0	0.31	0	0	0
140	1	1	0.88	0	1	1
141	1		0.60	0	0	1
142	0	0	0.71	0	0	1
143	0	1	0.91	0	0	1
144	0	0	0.78	0		1
145	1	1	0.54	0	0	0
146	1	1	0.40	0.5	1	0
147	0	1	0.59	0	0	0
148	1	1	0.58	0	0	1
149	1	1	0.53	0.5	0	1
150	0	1	0.58	1	0	0
151	1	0	0.62	0	0	1
152	0	1	0.31	0	0	0
153	1	1	0.74	0	1	1
154	1	0	0.48	0	0	0
155	0	0	0.51	0.5	0	1
156	1	0	0.75	0	1	0
157	1	0	0.59	0	0	0
158	0	1	0.56	0	0	1
159	1	0	0.40	0.5	0	0

Table B2a: Truth Table
Local Organizational Changes 2010 to 2013

LHD	Activity Changes	Special	Central	FTE	HIV Per 100k	Per Capita Expend
1	0	0.08	0	1	1	1
2	0	0.55	0.5	1	0	0
3	0	0.56	0	1	0	1
4	0	0.39	0.5	1	1	1
5	1	0.66	0	1	1	1
6	1	0.51	0	1	1	1
7	0	0.20	0.5	0	0	0
8	1	0.53	0	1	1	1
9	0	0.56	1	1	0	1
10	1	0.44	1	1	1	0
11	0	0.40	0.5	0	0	0
12	0	0.47	0	0	0	0
13	0	0.71	0	0	1	0
14	0	0.32	0.5	0	1	0
15	0	0.39	0	0	0	0
16	0	0.45	0.5	0	0	0
17	1	0.54	0	1	1	1
18	1	0.31	0.5	0	1	0
19	0	0.43	0	0	0	0
20	1	0.16	0.5	0	0	0
21	0	0.62	0	1	1	1
22	1	0.57	0	1	0	1
23	0	0.31	0	1	1	0
24	0	0.64	0	0	1	0
25	0	0.33	0	0	0	0
26	0	0.20	0	0	0	0
27	1	0.37	0.5	0	0	0
28	1	0.55	0	1	1	1
29	1		0	0	1	1
30	1	0.57	0	1	1	1
31	0	0.46	0	1	1	1
32	0	0.43	0	1	0	0
33	0	0.62	0	1	1	1
34	0	0.57	0	1	0	0
35	1	0.56	0	1	1	0
36	0	0.53	0	1	1	1
37	1	0.30	0	0	0	1
38	1	0.59	0	1	0	1
39	0	0.62	1	1	1	1

Table B2a: Continued

40	0	0.47	0	0	0	
41	0	0.49	0	1	0	1
42	0	0.05	0	0	1	0
43	0	0.46	0.5	1	0	1
44	0	0.53	1	1	1	0
45	0	0.51	1	1	1	1
46	0	0.25	0.5	0	0	0
47	1	0.48	0	1	0	1
48	1	0.47	0	0	0	1
49	1	0.11		1	1	1
50	1	0.51	0	1	1	1
51	1	0.41	0	0	1	0
52	1	0.34	0.5	1	1	0
53	1	0.55	0	0	1	1
54	1	0.55	1	1	1	1
55	1	0.64	0.5	1	1	1
56	0	0.11	0	0	1	0
57	0	0.53	0	0	0	0
58	0	0.64	0.5	1	1	1
59	0	0.48	0	0	0	0
60	1	0.31	0	0	0	
61	0	0.46	0	0	1	
62	1	0.62	0	0	0	1
63	1	0.57	0	1	1	1
64	0	0.47	0.5	0	0	1
65	0	0.76	0	1	0	1
66	1	0.39	1	0	1	0
67	1	0.52	0	0	1	1
68	1	0.62	0	1	1	1
69	1	0.44	0	1	1	1
70	0	0.61	0	0	0	0
71	1	0.51	0	0	0	1
72	0	0.32	0	1	1	0
73	1	0.76	0	1	1	1
74	0	0.52	0	1	1	1
75	0	0.56	0.5	1		1
76	0	0.53	0.5	1	1	1
77	0	0.64	0	0	1	0
78	1	0.43	0	0	1	1
79	1	0.36	0	0	0	1
80	1	0.68	0	.	0	
81	0	0.44	0.5	0	0	0

Table B2a: Continued

82	0	0.34	0	1	1	1
83	0	0.47	0	0	0	
84	0	0.61	0	1	1	1
85	0	0.38	0	0	0	1
86	1	0.17	0.5	0	0	
87	1	0.60	0	1	0	1
88	0	0.31	0.5	0	0	0
89	1	0.40	0.5	0	0	0
90	1	0.21	0.5	0	0	0
91	0	0.60	0	1	0	1
92	0	0.61	0	0	0	1
93	0	0.52	0.5	0	1	
94	0	0.51	0	1	0	1
95	0	0.54	0	1	0	1
96	0	0.70	1	1	1	1
97	0	0.46	1	0	0	0
98	0	0.56	0	0	1	
99	0	0.68	0.5	1	1	1
100	0	0.01	0	.	0	
101	1	0.66	1	1	1	1
102	1	0.64	1	1	1	1
103	0	0.23	0	0	0	0
104	1	0.74	0	1	1	1
105	1	0.59	0.5	0	0	0
106	0	0.53	0	1	1	
107	0	0.51	1	0	1	0
108	0	0.53	1	0	0	0
109	1	0.59	0	1	1	1
110	1	0.54	0.5	0	1	
111	0	0.51	1	0	0	0
112	0	0.22	0.5	0	1	
113	0	0.40	1	0	0	0
114	1	0.38	0.5	0	0	
115	0	0.57	1	1	1	
116	1	0.49	0.5	0	1	
117	0	0.47	0.5	0	0	1
118	1	0.46	0	1	0	1
119	1	0.31	0	0	1	0
120	0	0.16	0	1	0	0
121	1	0.49	0.5	1	1	
122	0	0.64	0	.	0	1
123	0	0.87	0	1	1	1

Table B2a: Continued

124	0	0.33	0	0	1	1
125	1	0.17	0	1	0	1
126	1	0.45	0	0	0	
127	1	0.54	1	0	1	0
128	0	0.37	0	0	0	
129	0	0.52	0	1	0	1
130	1	0.37	0.5	0	0	0
131	0	0.44	0.5	0	1	0
132	1	0.61	0.5	1	1	1
133	1	0.20	0.5	0	0	0
134	0	0.45	0	0	0	1
135	1	0.55	0	1	1	1
136	1	0.46	0	1	0	
137	0	0.38	0	0	0	
138	0	0.85	0	1	0	1
139	0	0.55	0	0	0	1
140	1	0.56	0	1	0	1
141	1	0.47	0.5	1	1	0
142	0	0.71	0	0	0	0
143	0	0.53	0	1	0	0
144	1	0.68	0	1	0	1
145	1	0.47	0.5	1	1	
146	0	0.01	0	0	1	
147	1	0.63	0	0	0	1
148	0	0.34	0	1	0	1
149	1	0.51	0.5	0		0
150	0	0.49	1	1	1	1
151	0	0.74	0	1	1	1
152	1	0.44	0	0	0	0
153	0	0.53	0.5	0	0	1
154	1	0.51	0	0	1	0
155	1	0.62	0	1	1	1
156	0	0.53	0	1	0	
157	0	0.37	0.5	0	0	0

Table B2b: Truth Table
Local Organizational Changes 2014 to 2016

LHD	Activity Changes	FTE	HIV Per 100k	Special	Central	Per Capita Expend
1	0	0		0.388235	0.5	1
2	1	.	0	0.529412	0.5	0
3	1	.	0	0.470588	0	1
4	0	1	1	0.411765	0.5	1
5	1	1	1	0.611765	0	0
6	0	.	1	0.623529	0	1
7	0	0	0	0.105882	0.5	0
8	0	1	1	0.505882	0	1
9	1	0	0	0.576471	0	0
10	1	0	1	0.741176	0	0
11	0	0	0	0.423529	0	0
12	0	0	0	0.517647	0.5	0
13	1	1	1	0.447059	0	1
14	0	.	0	0.6	0	0
15	0	1	1	0.552941	0	0
16	0	1	1	0.423529	0	0
17	1	0	1	0.152941	0.5	0
18	1	1	1	0.647059	0	1
19	0	0	1	0.576471	0	0
20	0	1	1	0.4	0	0
21	0	.	1	0.541176	0	0
22	0	0	0	0.341176	0	0
23	0	.	1		0.5	0
24	0	.	1	0.6	0	0
25	1	0		0.352941	0	0
26	0	0	0	0.364706	0.5	0
27	0	0	1	0.4	0	0
28	0	0	1	0.352941	0	1
29	0	1	0	0.517647	0	0
30	1	0	0	0.705882	0	0
31	1	.	0	0.423529	0	0
32	1	.	0	0.341176	0	1
33	0	0	0	0.470588	0	0
34	0	.	1	0.364706	0.5	0
35	0	.	0	0.305882	0	0
36	1	0	1	0.094118	0	0
37	1	1	0	0.541176	0.5	1
38	1	0	1	0.529412	1	0
39	0	0	1	0.611765	1	0

Table B2b: Continued

40	0	0	1	0.494118	1	1
41	0	0	1	0.388235	1	0
42	1	1	1	0.494118	1	0
43	0	1	1	0.623529	1	0
44	1	1	1	0.564706	1	0
45	0	1	1	0.541176	1	1
46	0	1	0	0.541176	1	0
47	0	1	1	0.682353	1	1
48	1	1	1	0.6	1	1
49	0	1	1	0.670588	1	0
50	0	1	1	0.6	1	0
51	0	0	1	0.211765	0.5	1
52	0	0	1	0.517647	0	0
53	0	1	1	0.435294	0	1
54	1	0	0	0.505882	0	0
55	1	1		0.376471		1
56	1	1	1	0.635294	0	1
57	1	0	1	0.4	0	0
58	1	1	1	0.482353	0.5	0
59	0	1	1	0.552941	0	1
60	1	1	1	0.588235	0.5	1
61	0	0	1	0.105882	0	0
62	0	0	1	0.552941	0	1
63	0	.	0	0.623529	0.5	0
64	0	0	0	0.517647	0	0
65	0	0	0	0.305882	0	0
66	0	0	1	0.435294	0	1
67	1	0	0	0.647059	0	1
68	0	0	1	0.541176	0.5	1
69	0	1	0	0.764706	0	0
70	0	.	1	0.447059	0	1
71	0	1	1	0.623529	0	1
72	0	.	1	0.588235	0	0
73	0	.	0	0.494118	1	0
74	1	0	0	0.541176	0	0
75	0	1	1	0.329412	0	0
76	1	0	1	0.788235	0	0
77	1	1	1	0.588235	0	1
78	0	.	1	0.505882	0.5	1
79	1	0	1	0.682353	0	0
80	0	1	1	0.258824	1	0
81	0	0	1	0.505882	0	1

Table B2b: Continued

82	0	0	1	0.211765	0	1
83	0	1	1	0.764706	0.5	1
84	1	1	0	0.435294	0	1
85	1	1	0	0.870588	0	1
86	0	0	0	0.435294	0.5	0
87	0	0	1	0.105882	0.5	0
88	0	1	0	0.058824	0	0
89	1	1	1	0.658824	0	1
90	1	0	0	0.270588	0.5	0
91	0	1	0	0.623529	0	1
92	0	1	0	0.423529	0	0
93	0	1	0	0.6	0	1
94	1	0	0	0.411765	0.5	0
95	0	0	0	0.635294	0	0
96	1	0	0	0.247059	0.5	0
97	0	.	0	0.635294	0	1
98	0	1	0	0.458824	0	0
99	1	0	0	0.282353	0.5	0
100	0	1	0	0.541176	0	0
101	0	.	0	0.611765	0	1
102	1	1	1	0.541176	0.5	0
103	1	.	0	0.576471	0	1
104	0	0	1	0.341176	0.5	0
105	1	0	1	0.423529	0.5	0
106	0	0	0	0.4	0.5	0
107	1	0	0	0.694118	0.5	0
108	0	1	1	0.623529	0	0
109	0	0	1	0.458824	0	0
110	0	1	0	0.541176	1	0
111	0	.	1	0.576471	0.5	0
112	0	1	0	0.529412	0	0
113	0	0	0	0.388235	0	0
114	0	0	0	0.211765	0	0
115	0	.	1	0.552941	0.5	1
116	1	1	0	0.658824	0	0
117	1	0	0	0.541176	0	0
118	0	0	1	0.447059	1	1
119	0	1	1	0.6	0	0
120	0	.	0	0.258824	1	0
121	1	1	1	0.717647	0	1
122	0	1	1	0.364706	0	1
123	1	0	1	0.305882	0	0

Table B2b: Continued

124	0	1	0	0.635294	0	0
125	0	0	1	0.352941	0	0
126	0	1	0	0.447059	0.5	1
127	0	.	0	0.458824	0	0
128	1	.	0	0.317647	0	1
129	0	1		0.541176	0	1
130	0	0	0	0.258824	0	0
131	1	1	1	0.623529	0.5	1
132	1	0	0	0.541176	0	0
133	1	1	0	0.447059	0	1
134	0	1	0	0.294118	0	1
135	1	0	0	0.364706	0.5	0
136	1	0	1	0.141176	0.5	0
137	1	1	1	0.152941	0.5	0
138	1	0	0	0.211765	0.5	0
139	0	0	0	0.305882	0	0
140	1	.	1	0.6	0	1
141	1	1	0	0.882353	0	1
142	0	0	0	0.705882	0	1
143	0	1	0	0.905882	0	1
144	0	0		0.776471	0	1
145	0	1	0	0.541176	0	0
146	1	1	1	0.4	0.5	0
147	0	1	0	0.588235	0	0
148	1	1	0	0.576471	0	1
149	1	1	0	0.529412	0.5	1
150	0	1	0	0.576471	1	0
151	0	0	0	0.623529	0	1
152	0	1	0	0.305882	0	0
153	1	1	1	0.741176	0	1
154	1	0	0	0.482353	0	0
155	0	0	0	0.505882	0.5	1
156	0	0	1	0.752941	0	0
157	1	0	0	0.588235	0	0
158	0	1	0	0.564706	0	1
159	1	0	0	0.4	0.5	0

Table B3: Truth Table
State Policy Changes All Years

State	Policies	FTE	Special	Central	Per Capita Expend	HIV Per 100k
1	0	1	0.62	0	1	1
2	0	0	0.37	0	1	0
3	1	1	0.36	0	0	1
4	1	1	0.51	1	1	1
5	1	1	0.37	0	0	1
6	0	1	0.49	0	0	1
7	0	0	0.41	0	1	0
8	1	0	0.41	0	1	1
9	1	1	0.67	1	0	1
10	1	0	0.36	0	0	1
11	0	1	0.52	.	1	0
12	1	0	0.24	0	0	0
13	1	1	0.24	0	0	1
14	1	0	0.24	0	0	0
15	0	0	0.24	0	1	0
16	0	0	0.24	0	0	0
17	0	0	0.24	0	0	0
18	1	0	0.24	0	0	1
19	1	0	0.24	0	1	0
20	1	1	0.24	0	0	1
21	1	1	0.24	0	1	1
22	0	0	0.24	0	0	1
23	0	1	0.24	0	1	0
24	0	1	0.24	1	1	1
25	0	1	0.24	0	0	1
26	0	0	0.24	0	1	0
27	1	0	0.24	0	0	0
28	0	0	0.24	0	0	0
29	0	0	0.24	0	1	1
30	0	1	0.24	0	0	0
31	1	1	0.24	0	1	1
32	1	1	0.24	0	0	1
33	0	0	0.24	0	1	0
34	1	0	0.24	0	0	1
35	1	1	0.24	0	1	0
36	1	0	0.24	0	0	0
37	1	1	0.24	0	1	1
38	1	0	0.24	.	1	0

Table B3: Continued

39		1	0.24	1	0	1
40	1	0	0.24	0	1	0
41	0	1	0.24	0	0	1
42	1	1	0.24	0	1	1
43	1	0	0.24	0	0	0
44	0	0	0.24	1	1	0
45	1	1	0.24	0	0	1
46	1	1	0.24	0	0	0
47	1	0	0.24	0	1	0
48	0	0	0.24	0	0	0
49	0	1	0.24	0	1	0

Table B3a: Truth Table
State Policy Changes 2010-2012

State	Policy Changes	Central	Special	FTE	HIV Per 100k	Per capita Expend
1	0	0	0.59	1	1	1
2	0	0	0.35	0	0	1
3	0	0	0.47	1	1	0
4	1	1	0.45	1	1	1
5	1	0	0.29	1	1	1
6	0	0	0.43	1	0	0
7	0	0	0.40	0	1	0
8	1	0	0.38	0	1	1
9	1	1	0.61	1	1	1
10	1	0	0.37	0	1	0
11	0	.	0.53	1	0	1
12	1	0	0.36	0	0	0
13	1	0	0.36	0	1	0
14	1	0	0.45	0	0	0
15	0	0	0.33	0	0	0
16	0	0	0.39	0	0	0
17	0	0	0.25	0	1	1
18	0	0	0.54	1	1	0
19	1	0	0.38	0	0	1
20	1	0	0.32	1	1	0
21	1	0	0.75	1	1	1
22	0	0	0.25	0	1	1
23	0	0	0.36	1	0	1
24	0	1	0.63	1	1	1
25	0	0	0.34	1	1	0
26	0	0	0.39	0	0	0
27	1	0	0.37	0	0	1
28	0	0	0.37	0	0	0
29	0	0	0.37	1	1	1
30	0	0	0.36	1	0	0
31	1	0	0.43	1	1	1
32	1	.	0.40	1	1	0
33	0	0	0.45	0	0	1
34	1	0	0.29	0	1	0
35	1	0	0.52	1	0	1
36	1	0	0.38	0	0	0
37	1	0	0.32	1	1	0
38	1	.	0.59	0	0	1
39	1	0	0.37	0	0	1

Table B3a: Continued

40	0	0	0.54	1	1	1
41	1	0	0.49	1	1	1
42	1	0	0.41	0	0	0
43	0	1	0.40	0	0	1
44	1	0	0.59	1	1	0
45	0	0	0.33	1	0	0
46	1	0	0.37	0	0	1
47	0	0	0.33	0	0	0
48	0	0	0.41	1	0	0

Table B3b: Truth Table
State Policy Changes 2013-2016

State	Policy Changes	FTE	Special	Central	Per Capita Expend	HIV Per 100k
1	0	1	0.62	0	1	1
2	0	0	0.37	0	1	0
3	1	1	0.36	0	0	1
4	0	1	0.51	1	1	1
5	1	1	0.37	0	0	1
6	0	1	0.49	0	0	1
7	0	0	0.41	0	1	0
8	0	0	0.41	0	1	1
9	1	1	0.67	1	0	1
10	0	0	0.36	0	0	1
11	0	1	0.52	.	1	0
12	0	0	0.24	0	0	0
13	1	1	0.28	0	0	1
14	0	0	0.47	0	0	0
15	0	0	0.35	0	1	0
16	0	0	0.36	0	0	0
17	0	0	0.29	0	0	0
18	1	0	0.60	0	0	1
19	0	0	0.39	0	1	0
20	1	1	0.21	0	0	1
21	1	1	0.78	0	1	1
22	0	0	0.28	0	0	1
23	0	1	0.38	0	1	0
24	0	1	0.53	1	1	1
25	0	1	0.35	0	0	1
26	0	0	0.32	0	1	0
27	0	0	0.43	0	0	0
28	0	0	0.15	0	0	0
29	0	0	0.34	0	1	1
30	0	1	0.57	0	0	0
31	1	1	0.48	0	1	1
32	0	1	0.34	0	0	1
33	0	0	0.47	0	1	0
34	0	0	0.31	0	0	1
35	0	1	0.58	0	1	0
36	0	0	0.37	0	0	0
37	0	1	0.38	0	1	1
38	0	0	0.58	.	1	0

Table B3b: Continued

39		1	0.51	1	0	1
40	0	0	0.42	0	1	0
41	0	1	0.59	0	0	1
42	1	1	0.50	0	1	1
43	0	0	0.37	0	0	0
44	0	0	0.43	1	1	0
45	0	1	0.55	0	0	1
46	1	1	0.43	0	0	0
47	0	0	0.39	0	1	0
48	0	0	0.23	0	0	0
49	0	1	0.31	0	1	0

Table B4: Truth Table
State Organizational Changes All Years

State	Change	FTE	Special	Central	Per Capita Expend	HIV Per 100k
1	1	1	0.62	0	1	1
2	0	0	0.37	0	1	0
3	1	1	0.36	0	0	1
4	1	1	0.51	1	1	1
5	1	1	0.37	0	0	1
6	1	1	0.49	0	0	1
7	1	0	0.41	0	1	0
8	1	0	0.41	0	1	1
9	0	1	0.67	1	0	1
10	1	0	0.36	0	0	1
11	1	1	0.52	.	1	0
12	1	0	0.24	0	0	0
13	1	1	0.28	0	0	1
14	1	0	0.47	0	0	0
15	1	0	0.35	0	1	0
16	1	0	0.36	0	0	0
17	1	0	0.29	0	0	0
18	1	0	0.60	0	0	1
19	1	0	0.39	0	1	0
20	1	1	0.21	0	0	1
21	0	1	0.78	0	1	1
22	1	0	0.28	0	0	1
23	1	1	0.38	0	1	0
24	0	1	0.53	1	1	1
25	1	1	0.35	0	0	1
26	1	0	0.32	0	1	0
27	1	0	0.43	0	0	0
28	1	0	0.15	0	0	0
29	1	0	0.34	0	1	1
30	1	1	0.57	0	0	0
31	0	1	0.48	0	1	1
32	1	1	0.34	0	0	1
33	1	0	0.47	0	1	0
34	1	0	0.31	0	0	1
35	1	1	0.58	0	1	0
36	0	0	0.37	0	0	0
37	0	1	0.38	0	1	1

Table B4: Continued

38	1	0	0.58	.	1	0
39	0	1	0.51	1	0	1
40	1	0	0.42	0	1	0
41	1	1	0.59	0	0	1
42	1	1	0.50	0	1	1
43	1	0	0.37	0	0	0
44	1	0	0.43	1	1	0
45	1	1	0.55	0	0	1
46	1	1	0.43	0	0	0
47	0	0	0.39	0	1	0
48	0	0	0.23	0	0	0
49	1	1	0.31	0	1	0

Table B4a: Truth Table
State Organizational Changes 2010-2012

State	Activity Changes	Central	Special	FTE	HIV Per 100k	Per Capita Expend
1	0	0	0.59	1	1	1
2	0	0	0.35	0	0	1
3	0	0	0.47	1	1	0
4	1	1	0.45	1	1	1
5	1	0	0.29	1	1	1
6	1	0	0.43	1	0	0
7	0	0	0.40	0	1	0
8	1	0	0.38	0	1	1
9	0	1	0.61	1	1	1
10	1	0	0.37	0	1	0
11	1	.	0.53	1	0	1
12	0	0	0.36	0	0	0
13	1	0	0.36	0	1	0
14	1	0	0.45	0	0	0
15	0	0	0.33	0	0	0
16	1	0	0.39	0	0	0
17	0	0	0.25	0	1	1
18	1	0	0.54	1	1	0
19	0	0	0.38	0	0	1
20	0	0	0.32	1	1	0
21	0	0	0.75	1	1	1
22	1	0	0.25	0	1	1
23	1	0	0.36	1	0	1
24	0	1	0.63	1	1	1
25	1	0	0.34	1	1	0
26	1	0	0.39	0	0	0
27	0	0	0.37	0	0	1
28	1	0	0.37	0	0	0
29	0	0	0.37	1	1	1
30	1	0	0.36	1	0	0
31	0	0	0.43	1	1	1
32	1	.	0.40	1	1	0
33	1	0	0.45	0	0	1
34	1	0	0.29	0	1	0
35	0	0	0.52	1	0	1
36	0	0	0.38	0	0	0
37	0	0	0.32	1	1	0
38	1	.	0.59	0	0	1

Table B4a: Continued

39	0	0	0.37	0	0	1
40	1	0	0.54	1	1	1
41	0	0	0.49	1	1	1
42	1	0	0.41	0	0	0
43	0	1	0.40	0	0	1
44	1	0	0.59	1	1	0
45	1	0	0.33	1	0	0
46	0	0	0.37	0	0	1
47	0	0	0.33	0	0	0
48	0	0	0.41	1	0	0

Table B4b: Truth Table
State Organizational Changes 2013-2016

State	Activity Changes	FTE	Special	Central	Per Capita Expend	HIV Per 100k
1	1	1	0.62	0	1	1
2	0	0	0.37	0	1	0
3	1	1	0.36	0	0	1
4	1	1	0.51	1	1	1
5	1	1	0.37	0	0	1
6	1	1	0.49	0	0	1
7	1	0	0.41	0	1	0
8	1	0	0.41	0	1	1
9	0	1	0.67	1	0	1
10	0	0	0.36	0	0	1
11	1	1	0.52	.	1	0
12	1	0	0.24	0	0	0
13	1	1	0.28	0	0	1
14	0	0	0.47	0	0	0
15	1	0	0.35	0	1	0
16	1	0	0.36	0	0	0
17	1	0	0.29	0	0	0
18	1	0	0.60	0	0	1
19	1	0	0.39	0	1	0
20	1	1	0.21	0	0	1
21	0	1	0.78	0	1	1
22	1	0	0.28	0	0	1
23	1	1	0.38	0	1	0
24	0	1	0.53	1	1	1
25	1	1	0.35	0	0	1
26	0	0	0.32	0	1	0
27	1	0	0.43	0	0	0
28	1	0	0.15	0	0	0
29	1	0	0.34	0	1	1
30	0	1	0.57	0	0	0
31	0	1	0.48	0	1	1
32	1	1	0.34	0	0	1
33	1	0	0.47	0	1	0
34	1	0	0.31	0	0	1
35	1	1	0.58	0	1	0
36	0	0	0.37	0	0	0
37	0	1	0.38	0	1	1
38	1	0	0.58	.	1	0
39	0	1	0.51	1	0	1

Table B4b: Continued

40	1	0	0.42	0	1	0
41	0	1	0.59	0	0	1
42	1	1	0.50	0	1	1
43	1	0	0.37	0	0	0
44	1	0	0.43	1	1	0
45	1	1	0.55	0	0	1
46	0	1	0.43	0	0	0
47	0	0	0.39	0	1	0
48	0	0	0.23	0	0	0
49	1	1	0.31	0	1	0

APPENDIX C: BOTTOM-UP TRUTH TABLES

Table C1: Truth Table
Local Policy Changes All Years

LHD	Trans-Fat Ban	Central	Special	FTE	Coronary Death Rate	Per Capita Expend
1	0	0	0.40	1	0	1
2	0	0	0.64	1	0	0
3	0	0.5	0.42	1	0	1
4	1	0	0.60	1	1	1
5	0	0	0.44	.	1	
6	0	0	0.60	0	0	1
7	0	0.5	0.21	0	0	
8	1	0	0.56	1	0	1
9	0	1	0.52	1	1	0
10	0	1	0.50	1	1	0
11	0	0.5	0.53	0	0	0
12	0	0	0.58	0	1	0
13	0	0	0.55	0	1	1
14	0	0	0.41	0	0	
15	0	0.5	0.56	0	0	
16	1	0	0.60	1	1	0
17	0	0.5	0.28	1	0	0
18	0	0.5	0.44	0	1	1
19	0	0	0.37	0	0	0
20	0	0	0.57	0	1	0
21	0	0	0.65	0	0	0
22	0	0.5	0.21	0	0	
23	0	0	0.60	1	1	0
24	0	0	0.80	1	0	
25	1	0	0.50	1	1	0
26	0	0	0.33	1	0	0
27	0	0	0.66	0	1	0
28	0	0	0.35	0	0	1
29	0	0.5	0.30	1	0	0
30	0	0	0.60	1	0	0
31	0	0	0.19	.		0
32	0	0.5	0.43	0	0	1
33	0	0	0.60	1	0	0

Table C1: Continued

34	1	0	0.78	1	1	
35	0	0	0.65	1	0	
36	0		0.53	.	1	
37	0	0	0.50	0	0	1
38	0	0	0.56	1	0	0
39	0	1	0.65	1	1	0
40	0	0	0.44	0	0	1
41	0	0	0.58	1	1	0
42	1	0	0.05	0	1	0
43	1	0	0.10	0	1	0
44	0	0.5	0.50	1	0	0
45	0	0.5	0.24	0	0	1
46	0	0	0.63	1	1	0
47	0	0	0.53	0	1	1
48	0	0	0.58	1	0	1
49	0	0	0.23	0	0	0
50	0	0	0.42	0	1	0
51	0	0.5	0.55	1	0	1
52	0	0	0.52	1	0	0
53	0	1	0.50	.	1	1
54	0	0.5	0.57	1	0	
55	0	0	0.21	0	1	1
56	0	0	0.53	0	0	1
57	0	0.5	0.57	1	0	0
58	0	0	0.49	0	0	0
59	0	0	0.42	0	0	1
60	0	0	0.41	0	0	1
61	0	0	0.45	0	1	
62	0	0	0.43	1	1	1
63	0	0.5	0.58	0	1	0
64	0	0	0.72	1	0	
65	0	1	0.41	0	0	0
66	0	0	0.51	1	1	1
67	0	0	0.71	.	1	1
68	0	0	0.58	1	0	1
69	0	0	0.55	0	1	
70	0	0	0.50	0	0	1
71	0	0	0.38	.	1	1
72	0	0	0.72	1	1	
73	0	0	0.50	1	0	0
74	0	0.5	0.65	1	1	0
75	0	0.5	0.59	1	1	0

Table C1: Continued

76	1	1	0.50	1	1	
77	0	0	0.70	0	1	1
78	0	0	0.44	0	1	1
79	0	0.5	0.49	1	1	0
80	0	0	0.64	0	0	0
81	0	0.5	0.40	0	0	1
82	1	0	0.49	1	0	1
83	0	0	0.22	0	0	1
84	0	0	0.48	1	0	1
85	1	0	0.45	1	1	1
86	0	0.5	0.34	0	0	0
87	1	0	0.64	1	1	
88	0	0.5	0.31	0	0	
89	0	0.5	0.19	0	0	1
90	0	0.5	0.34	0	0	
91	0	0	0.51	1	1	1
92	0	0	0.52	0	1	
93	0	0.5	0.47	0	1	1
94	0	0	0.62	1	0	
95	0	0	0.64	1	0	
96	0	1	0.70	.	0	0
97	0	1	0.71	1	0	1
98	0	1	0.45	0	1	
99	0	0	0.23	0	1	0
100	1	0.5	0.63	1	1	0
101	0	0	0.37	1	0	1
102	0	1	0.67	1	1	
103	0	1	0.40	0	1	1
104	0	0	0.59	.	1	0
105	1	0	0.56	1	1	
106	0	0.5	0.58	.	0	
107	1	0	0.74	1	0	
108	0	1	0.44	0	0	0
109	0	1	0.00	.	1	
110	0	0	0.69	1	1	0
111	0	1	0.31	0	1	
112	0	0.5	0.40	0	1	0
113	0	1	0.42	1	0	
114	0	0.5	0.72	0	1	0
115	0	1	0.44	1	1	1
116	0	0.5	0.57	0	1	
117	0	1	0.55	1	1	0

Table C1: Continued

118	0	0.5	0.38	0	1	1
119	0	1	0.31	1	0	
120	0	0.5	0.35	0	0	
121	0	0	0.55	1	1	1
122	0	0	0.38	1	1	1
123	0	0	0.62	0	0	0
124	0	0	0.57	1	0	0
125	0	0.5	0.47	1	1	0
126	0	0	0.64	.	1	1
127	0	0	0.94	1	0	0
128	0	0	0.29	0	1	1
129	0	0	0.47	1	0	1
130	1	0	0.31	1	0	0
131	0	0	0.27	0	0	1
132	0	1	0.48	0	0	0
133	0	0	0.50	0	0	1
134	0	0	0.48	.	0	1
135	0	0.5	0.22	.	1	
136	1	0.5	0.24	0	1	
137	0	0.5	0.48	1	0	
138	0	0.5	0.37	0	1	
139	0	0	0.45	0	0	
140	0	0	0.76	1	1	1
141	0	0	0.33	0	1	1
142	1	0	0.88	1	1	1
143	0	0	0.65	.	1	1
144	0	0.5	0.40	1	1	1
145	0	0	0.62	1	0	0
146	0	0	0.70	.	1	0
147	0	0.5	0.59	0	1	0
148	0	0	0.20	0	0	1
149	0	0	0.77	0	0	1
150	0	0.5	0.19	0	0	0
151	0	0	0.53	0	1	1
152	0	0.5	0.43	0		
153	0	1	0.66	.	0	1
154	0	0	0.51	1	0	0
155	0	0	0.44	0	0	1
156	0	0.5	0.60	.	1	0
157	1	0	0.44	.	1	
158	1	0	0.60	1	1	1
159	0	0	0.53	0	1	0

Table C2: Truth Table
State Policy Changes All Years

State	Trans-Fat Ban	FTE	Special	Central	Coronary Death Rate	Per Capita Expend
1	0	1	0.62	0	0	1
2	0	0	0.37	0	0	1
3	0	1	0.36	0	0	0
4	0	1	0.51	1	1	1
5	1	1	0.37	0	0	0
6	1	1	0.50	0	0	0
7	0	0	0.41	0	0	1
8	1	0	0.41	0	1	1
9	0	1	0.67	1	1	0
10	0	0	0.36	0	0	0
11	0	1	0.52	.	0	1
12	0	0	0.25	0	0	0
13	1	1	0.28	0	0	0
14	0	0	0.48	0	1	0
15	0	0	0.35	0	1	1
16	0	0	0.36	0	0	0
17	0	0	0.29	0	1	0
18	0	0	0.60	0	1	0
19	0	0	0.39	0	0	1
20	0	1	0.21	0	1	0
21	0	1	0.78	0	0	1
22	0	0	0.28	0	1	0
23	0	1	0.38	0	0	1
24	0	1	0.53	1	1	1
25	0	1	0.35	0	1	0
26	0	0	0.32	0	0	1
27	0	0	0.43	0	0	0
28	0	0	0.15	0	0	0
29	0	0	0.34	0	1	1
30	0	1	0.57	0	1	0
31	0	1	0.49	0	1	1
32	0	1	0.34	0	0	0
33	1	0	0.48	0	0	1
34	0	0	0.31	0	1	0
35	0	1	0.58	0	1	1
36	0	0	0.37	0	0	0
37	1	1	0.38	0	1	1
38	0	0	0.58	.	1	1

Table C2: Continued

39	0	1	0.51	1	1	0
40	0	0	0.42	0	1	1
41	0	1	0.59	0	1	0
42	0	1	0.5	0	1	1
43	0	0	0.37	0	0	0
44	0	0	0.43	1	1	1
45	0	1	0.55	0	0	0
46	0	1	0.43	0	0	0
47	0	0	0.39	0	1	1
48	0	0	0.23	0	0	0
49	0	1	0.31	0	0	1

Table C3: Truth Table
Local Activity Changes All Years

LHD	Activity Changes	Central	Special	FTE	Coronary Death Rates	Per Capita Expend
1	0	0.5	0.39	0	1	1
2	0	0.5	0.53		1	0
3	0	0	0.47		0	1
4	1	0.5	0.41	1	0	1
5	1	0	0.62		1	
6	1	0	0.61	1	1	1
7	0	0.5	0.11	0	1	
8	1	0	0.51	1	0	1
9	1	0	0.58	0	0	0
10	1	0	0.74	0	1	0
11	1	0	0.42	0	0	0
12	1	0.5	0.52	0	0	0
13	1	0	0.45	1	1	1
14	0	0	0.60		0	
15	1	0	0.55	1	0	
16	1	0	0.42	1	1	0
17	1	0.5	0.15	0	0	0
18	1	0	0.65	1	0	1
19	0	0	0.58	0	1	0
20	0	0	0.40	1	0	0
21	1	0	0.54		1	0
22	0	0	0.34	0	0	
23	1	0.5			1	0
24	1	0	0.60		0	
25	1	0	0.35	0	0	0
26	1	0.5	0.36	0	0	0
27	1	0	0.40	0	0	0
28	1	0	0.35	0	1	1
29	0	0	0.52	1	0	0
30	1	0	0.71	0	0	0
31	1	0	0.42		0	0
32	1	0	0.34		0	1
33	1	0	0.47	0	0	0
34	1	0.5	0.36		0	
35	1	0	0.31		1	
36	0	0	0.09	0	1	
37	1	0.5	0.54	1	0	1
38	1	1	0.49	0	1	0

Table C3: Continued

39	0	1	0.54	1	0	0
40	0	1	0.68	1	1	1
41	1	1	0.54	1	1	0
42	1	1	0.49	1	0	0
43	1	1	0.67	1	1	0
44	1	1	0.60	1	1	0
45	1	1	0.60	1	0	1
46	1	1	0.53	0	1	0
47	1	1	0.56	1	1	1
48	1	1	0.62	1	1	1
49	1	1	0.61	0	1	0
50	0	1	0.39	0	1	0
51	0	0.5	0.21	0	0	1
52	0	0	0.52	0	0	0
53	1	0	0.44	1	1	1
54	1	0	0.51	0	1	
55	1		0.38	1	1	1
56	1	0	0.64	1	0	1
57	0	0	0.40	0	1	0
58	1	0.5	0.48	1	1	0
59	1	0	0.55	1	0	1
60	0	0.5	0.59	1	1	1
61	0	0	0.11	0	1	
62	1	0.5	0.62		0	1
63	0	0	0.55	0	0	0
64	1	0	0.52	0	0	
65	0	0	0.31	0	0	0
66	1	0	0.44	0	0	1
67	1	0	0.65	0	1	1
68	1	0.5	0.54	0	1	1
69	0	0	0.76	1	0	
70	0	0	0.45		1	1
71	1	0	0.62	1	1	1
72	0	0	0.59		0	
73	1	1	0.49		0	0
74	1	0	0.54	0	1	0
75	1	0	0.33	1	0	0
76	0	0	0.79	0	1	
77	1	0	0.59	1	0	1
78	1	0.5	0.51		1	1
79	1	0	0.68	0	0	0
80	0	1	0.26	1	1	0

Table C3: Continued

81	1	0	0.51	0	1	1
82	0	0	0.21	0	0	1
83	1	0.5	0.76	1	1	1
84	0	0	0.44	1	0	1
85	1	0	0.87	1	0	1
86	1	0.5	0.44	0	0	0
87	1	0	0.06	1	0	
88	0	0.5	0.11	0	0	
89	1	0	0.66	1	0	1
90	1	0.5	0.27	0	1	
91	1	0	0.62	1	1	1
92	0	0	0.60	1	0	
93	1	0	0.42	1	0	1
94	1	0.5	0.41	0	0	
95	1	0.5	0.25	0	0	
96	1	0	0.64	0	0	0
97	1	0	0.64		0	1
98	0	0.5	0.28	0	1	
99	1	0	0.46	1	1	0
100	0	0	0.54	1	1	0
101	1	0	0.61		1	1
102	1	0.5	0.54	1	1	
103	0	0	0.58		1	1
104	0	0.5	0.69	0	0	0
105	1	0.5	0.40	0	1	
106	1	0.5	0.34	0	1	
107	0	0.5	0.42	0	0	
108	1	0	0.62	1	0	0
109	1	0	0.46	0	1	
110	0	1	0.54	1	1	0
111	1	0.5	0.58		1	
112	0	0	0.53	1	0	0
113	0	0	0.39	0	0	
114	1	0	0.21	0	1	0
115	1	0	0.66	1	0	1
116	1	0.5	0.55		0	
117	0	0	0.54	0	0	0
118	1	0	0.72	1	0	1
119	1	1	0.26		0	
120	0	1	0.45	0	1	
121	1	0	0.60	1	1	1
122	1	0	0.36	1	1	1

Table C3: Continued

123	1	0	0.31	0	1	0
124	1	0	0.64	1	0	0
125		0.5	0.45	1	1	0
126	1	0	0.46		1	1
127	0	0	0.35	0	1	0
128	1	0	0.54	1	0	1
129	0	0	0.32		0	1
130	1	0	0.26	0	1	0
131	0	0.5	0.62	1	1	1
132	0	0	0.54	0	0	0
133	1	0	0.45	1	0	1
134	1	0	0.29	1	0	1
135	1	0.5	0.36	0	1	
136	0	0.5	0.14	0	1	
137	1	0.5	0.15	1	1	
138	1	0.5	0.21	0	1	
139	0	0	0.31	0	0	
140	0	0	0.88	1	1	1
141	1	0	0.60		0	1
142	1	0	0.71	0	1	1
143	1	0	0.91	1	1	1
144	1	0	0.78	0	1	1
145	1	0	0.54	1	1	0
146		0.5	0.40	1	0	0
147	0	0	0.59	1	0	0
148	1	0	0.58	1	1	1
149	1	0.5	0.53	1	1	1
150	0	1	0.58	1	0	0
151	0	0	0.62	0	0	1
152	1	0	0.31	1	0	
153	1	0	0.74	1	0	1
154	0	0	0.48	0	0	0
155	1	0.5	0.51	0	1	1
156	0	0	0.75	0	1	0
157	1	0	0.59	0	1	
158		0	0.56	1	1	1
159	0	0.5	0.40	0	0	0

Table C3a: Truth Table
Local Activity Changes 2008-2010

LHD	Activity Changes	Central	Special	FTE	Coronary Death Rate	Per Capita Expend
1	0	0	0.52	1	0	1
2	0	0	0.53	1	1	1
3	1	0	0.43	1	1	1
4	0	0.5	0.20	0	0	
5	1	0	0.56	1	0	1
6	0	1	0.49	0	1	0
7	0	1	0.48	1	1	0
8	0	0.5	0.47	0	0	0
9	1	0	0.67	0	1	0
10	0	0	0.49	0	1	0
11	0	0	0.40	0	0	0
12	0	0.5	0.52	0	1	0
13	0	0	0.48	1	1	1
14	0	0.5	0.37	1	0	0
15	0	0	0.62	0	1	1
16	1	0	0.68	1	0	1
17	0	0	0.61	1	1	0
18	1	0.5	0.16	0	0	0
19	0	0	0.60	1	1	1
20	1	0	0.69	1	0	1
21	0	0	0.48	0	1	0
22	0	0	0.32	1	0	0
23	1	0	0.49	0	1	0
24	1	0.5	0.83	0	0	0
25	1	0	0.78	1	0	0
26	1	0	0.18	0	0	0
27	0	0.5	0.39	0	0	0
28	1	0	0.68	0	0	1
29	1	0	0.66	1	1	1
30	0	0	0.37	0	0	0
31	1	0	0.56	1	0	1
32	0	1	0.63	1	1	1
33	1	0	0.64	0	0	0
34	1	0	0.36	1	0	
35	1	0	0.40	0	0	0
36	1	0	0.52	1	1	1
37	0	0	0.00	0	1	0
38	0	0	0.09	0	1	0

Table C3a: Continued

39	0	0.5	0.46	1	0	1
40	0	0.5	0.28	0	0	0
41	1	0	0.62	1	1	1
42	0	0	0.49	1	0	0
43	0	0	0.49	0	1	
44	1		0.33	1	1	1
45	0	0	0.74	1	0	1
46	0	0	0.40	0	0	0
47	1	0.5	0.48	1	1	1
48	0	0	0.51	0	1	0
49	0	1	0.55	1	1	0
50	0	0.5	0.63	1	1	1
51	0	0	0.20	0	1	0
52	1	0.5	0.45	1	0	1
53	0	0	0.56	0	0	0
54	0	0	0.37	0	0	0
55	0	0	0.38	0	0	0
56	1	0	0.45	0	0	1
57	0	0	0.43	0	1	0
58	1	0	0.63	0	1	1
59	1	0.5	0.54	0	1	1
60	0	0	0.77	1	0	1
61	1	1	0.37	0	0	0
62	0	0	0.44	1	1	1
63	1	0	0.78	1	1	1
64	0	0	0.61	1	0	0
65	0	0	0.53	0	1	0
66	0	0	0.61	0	0	0
67	1	0	0.31	1	1	0
68	0	0	0.67	.	1	1
69	1	0	0.48	1	0	1
70	0	0.5	0.63	1	1	1
71	1	1	0.54	1	1	0
72	1	0	0.61	0	1	0
73	0	0	0.41	0	1	1
74	0	0.5	0.60	1	1	1
75	0	0	0.45	0	0	1
76	0	0	0.56	.	0	
77	1	0.5	0.47	0	0	0
78	0	0	0.37	1	0	1
79	0	0.5	0.10	0	0	
80	0	0	0.20	0	0	

Table C3a: Continued

81	1	0	0.60	1	0	1
82	0	0	0.43	.	1	1
83	0	0.5	0.26	0	0	0
84	1	0	0.54	1	1	1
85	0	0	0.47	0	0	1
86	1	0	0.63	0	0	1
87	0	0	0.43	1	0	1
88	1	0.5	0.29	0	0	
89	0	0.5	0.21	0	0	0
90	1	0	0.53	1	1	1
91	0	0	0.41	1	1	0
92	1	0	0.63	0	1	1
93	0	0.5	0.44	0	1	0
94	0	0	0.53	1	0	1
95	1	0	0.64	1	0	1
96	1	1	0.62	1	0	1
97	0	0.5	0.25	0	1	0
98	0	0.5	0.15	0	1	0
99	0	1	0.70	1	0	1
100	1	1	0.55	0	1	0
101	0	0	0.28	0	1	0
102	0	0.5	0.44	0	1	0
103	0	0.5	0.31	0	0	
104	0	0.5	0.68	1	1	1
105	0	0	0.46	1	0	0
106	0	1	0.66	1	1	1
107	0	1	0.64	1	1	1
108	0	0	0.29	0	1	0
109	0	0	0.56	1	1	0
110	0	0.5	0.54	0	0	0
111	1	0	0.68	1	1	1
112	0	0	0.78	1	0	1
113	0	1	0.29	0	1	0
114	0	0.5	0.46	.	0	
115	0	1	0.57	1	0	0
116	1	1	0.47	1	1	
117	0	1	0.38	1	1	1
118	0	0.5	0.32	0	1	1
119	0	0.5	0.56	0	0	
120	0	1	0.55	1	0	0
121	0	0.5	0.39	0	0	1
122	0	0	0.52	1	1	0

Table C3a: Continued

123	0	0	0.31	0	1	
124	0	0	0.57	1	0	0
125	0	0.5	0.47	1	0	0
126	0	0	0.70	1	1	1
127	0	0	0.87	1	0	1
128	0	0	0.31	0	1	0
129	1	0	0.75	.	0	
130	1	0	0.64	1	0	1
131	0	0	0.40	1	0	1
132	1	0	0.30	0	0	0
133	0	1	0.47	0	0	0
134	0	0.5	0.57	1	1	1
135	0	0	0.44	0	0	0
136	1	0	0.69	1	0	1
137	1	0.5	0.59	1	0	0
138	0	0	0.45	0	0	1
139	0	0	0.56	1	1	1
140	1	0	0.47	1	0	1
141	0	0	0.34	0	1	1
142	0	0	0.80	1	1	1
143	0	0	0.59	0	1	1
144	0	0.5	0.40	1	1	0
145	0	0	0.43	0	1	0
146	0	0	0.52	1	0	0
147	1	0	0.64	.	1	1
148	0	0.5	0.48	0	1	1
149	0	0	0.31	0	1	0
150	0	0	0.66	0	0	0
151	1	0	0.38	0	0	1
152	0	0.5	0.48	0	0	0
153	1	1	0.49	1	0	1
154	1	0	0.76	1	0	1
155	0	0	0.48	0	0	0
156	1	0.5	0.53	0	1	1
157	0	0	0.31	0	1	0
158	1	1	0.48	0	0	0
159	0	0	0.74	1	1	1
160	0	0	0.59	1	1	0

Table C3b: Truth Table
Local Activity Changes 2010-2013

LHD	Activity Changes	Special	Central	FTE	Per Capita Expend	Coronary Death Rate
1	0	0.08	0	1	1	0
2	0	0.55	0.5	1	0	1
3	0	0.56	0	1	1	0
4	0	0.39	0.5	1	1	0
5	1	0.66	0	1	1	1
6	0	0.51	0	1	1	1
7	0	0.20	0.5	0	0	0
8	0	0.53	0	1	1	0
9	0	0.56	1	1	1	1
10	0	0.44	1	1	0	1
11	0	0.40	0.5	0	0	0
12	1	0.47	0	0	0	0
13	0	0.71	0	0	0	1
14	0	0.32	0.5	0	0	1
15	1	0.39	0	0	0	0
16	0	0.45	0.5	0	0	0
17	0	0.54	0	1	1	1
18	0	0.31	0.5	0	0	0
19	0	0.43	0	0	0	0
20	0	0.16	0.5	0	0	0
21	0	0.62	0	1	1	0
22	1	0.57	0	1	1	0
23	0	0.31	0	1	0	0
24	0	0.64	0	0	0	1
25	0	0.33	0	0	0	0
26	0	0.20	0	0	0	
27	1	0.37	0.5	0	0	0
28	0	0.55	0	1	1	0
29	1		0	0	1	1
30	0	0.57	0	1	1	1
31	0	0.46	0	1	1	0
32	1	0.43	0	1	0	0
33	0	0.62	0	1	1	0
34	0	0.57	0	1	0	0
35	0	0.56	0	1	0	0
36	0	0.53	0	1	1	0
37	0	0.30	0	0	1	0
38	1	0.59	0	1	1	0

Table C3b: Continued

39	0	0.62	1	1	1	1
40	0	0.47	0	0		0
41	0	0.49	0	1	1	1
42	0	0.05	0	0	0	1
43	0	0.46	0.5	1	1	0
44	0	0.53	1	1	0	1
45	0	0.51	1	1	1	1
46	0	0.25	0.5	0	0	0
47	0	0.48	0	1	1	1
48	0	0.47	0	0	1	1
49	1	0.11		1	1	1
50	1	0.51	0	1	1	0
51	0	0.41	0	0	0	0
52	1	0.34	0.5	1	0	0
53	1	0.55	0	0	1	0
54	1	0.55	1	1	1	1
55	0	0.64	0.5	1	1	0
56	0	0.11	0	0	0	1
57	0	0.53	0	0	0	0
58	1	0.64	0.5	1	1	0
59	0	0.48	0	0	0	0
60	0	0.31	0	0		0
61	1	0.46	0	0		0
62	0	0.62	0	0	1	1
63	0	0.57	0	1	1	1
64	0	0.47	0.5	0	1	1
65	0	0.76	0	1	1	0
66	0	0.39	1	0	0	1
67	0	0.52	0	0	1	1
68	1	0.62	0	1	1	1
69	0	0.44	0	1	1	0
70	0	0.61	0	0	0	1
71	0	0.51	0	0	1	0
72	0	0.32	0	1	0	1
73	0	0.76	0	1	1	1
74	1	0.52	0	1	1	0
75	0	0.56	0.5	1	1	1
76	1	0.53	0.5	1	1	1
77	1	0.64	0	0	0	1
78	0	0.43	0	0	1	1
79	0	0.36	0	0	1	0
80	1	0.68	0	.		0

Table C3b: Continued

81	1	0.44	0.5	0	0	0
82	1	0.34	0	1	1	0
83	1	0.47	0	0		0
84	0	0.61	0	1	1	0
85	0	0.38	0	0	1	1
86	0	0.17	0.5	0		0
87	1	0.60	0	1	1	1
88	1	0.31	0.5	0	0	0
89	0	0.40	0.5	0	0	0
90	0	0.21	0.5	0	0	1
91	0	0.60	0	1	1	1
92	1	0.61	0	0	1	1
93	1	0.52	0.5	0		1
94	0	0.51	0	1	1	0
95	0	0.54	0	1	1	1
96	0	0.70	1	1	1	0
97	0	0.46	1	0	0	1
98	0	0.56	0	0		1
99	0	0.68	0.5	1	1	1
100	0	0.01	0	.		0
101	0	0.66	1	1	1	1
102	1	0.64	1	1	1	1
103	0	0.23	0	0	0	1
104	1	0.74	0	1	1	1
105	0	0.59	0.5	0	0	0
106	1	0.53	0	1		0
107	0	0.51	1	0	0	0
108	0	0.53	1	0	0	1
109	1	0.59	0	1	1	1
110	0	0.54	0.5	0		0
111	0	0.51	1	0	0	1
112	0	0.22	0.5	0		0
113	0	0.40	1	0	0	1
114	0	0.38	0.5	0		1
115	0	0.57	1	1		0
116	0	0.49	0.5	0		0
117	0	0.47	0.5	0	1	0
118	0	0.46	0	1	1	1
119	1	0.31	0	0	0	1
120	0	0.16	0	1	0	0
121	0	0.49	0.5	1		1
122	1	0.64	0	.	1	1

Table C3b: Continued

123	0	0.87	0	1	1	0
124	0	0.33	0	0	1	1
125	0	0.17	0	1	1	0
126	1	0.45	0	0		0
127	0	0.54	1	0	0	0
128	0	0.37	0	0		0
129	1	0.52	0	1	1	0
130	0	0.37	0.5	0	0	1
131	0	0.44	0.5	0	0	1
132	1	0.61	0.5	1	1	0
133	1	0.20	0.5	0	0	1
134	0	0.45	0	0	1	0
135	0	0.55	0	1	1	1
136	0	0.46	0	1		0
137	1	0.38	0	0		1
138	0	0.85	0	1	1	1
139	0	0.55	0	0	1	1
140	1	0.56	0	1	1	1
141	0	0.47	0.5	1	0	0
142	1	0.71	0	0	0	1
143	0	0.53	0	1	0	0
144	1	0.68	0	1	1	1
145	0	0.47	0.5	1		1
146	0	0.01	0	0		0
147	0	0.63	0	0	1	0
148	0	0.34	0	1	1	0
149	0	0.51	0.5	0	0	
150	0	0.49	1	1	1	1
151	1	0.74	0	1	1	0
152	0	0.44	0	0	0	0
153	0	0.53	0.5	0	1	1
154	0	0.51	0	0	0	1
155	1	0.62	0	1	1	1
156	0	0.53	0	1		1
157	0	0.37	0.5	0	0	0

Table C3c: Truth Table
Local Activity Changes 2013-2016

LHD	Activity Changes	Central	Special	FTE	Coronary Death Rate	Per Capita Expend
1	0	0.5	0.39	0	1	1
2	0	0.5	0.53	1	1	0
3	0	0	0.47	1	0	1
4	0	0.5	0.41	1	0	1
5	1	0	0.62	1	1	
6	0	0	0.61	1	1	1
7	0	0.5	0.11	0	1	
8	0	0	0.51	1	0	1
9	1	0	0.58	0	0	0
10	0	0	0.74	0	1	0
11	1	0	0.42	0	0	0
12	1	0.5	0.52	0	0	0
13		0	0.45	1	1	1
14	0	0	0.60	1	0	
15	0	0	0.55	1	0	
16	1	0	0.42	1	1	0
17	0	0.5	0.15	0	0	0
18	0	0	0.65	1	0	1
19	0	0	0.58	0	1	0
20	0	0	0.40	1	0	0
21	1	0	0.54	1	1	0
22	0	0	0.34	0	0	
23	0	0.5		1	1	0
24	1	0	0.6	1	0	
25	0	0	0.35	0	0	0
26	1	0.5	0.36	0	0	0
27	0	0	0.40	0	0	0
28	0	0	0.35	0	1	1
29	0	0	0.52	1	0	0
30	0	0	0.71	0	0	0
31	1	0	0.42	1	0	0
32	0	0	0.34	1	0	1
33	0	0	0.47	0	0	0
34	1	0.5	0.36	1	0	
35	0	0	0.31	1	1	
36	0	0	0.09	0	1	
37	0	0.5	0.54	1	0	1

Table C3c: Continued

38	1	1	0.49	0	1	0
39	0	1	0.54	1	0	0
40	0	1	0.68	1	1	1
41	1	1	0.54	1	1	0
42	1	1	0.49	1	0	0
43	0	1	0.67	1	1	0
44	1	1	0.60	1	1	0
45	1	1	0.60	1	0	1
46	1	1	0.53	0	1	0
47	1	1	0.56	1	1	1
48	0	1	0.62	1	1	1
49	1	1	0.61	0	1	0
50	0	1	0.39	0	1	0
51	0	0.5	0.21	0	0	1
52	0	0	0.52	0	0	0
53	0	0	0.44	1	1	1
54	0	0	0.51	0	1	
55	0		0.38	1	1	1
56	1	0	0.64	1	0	1
57	0	0	0.40	0	1	0
58	0	0.5	0.48	1	1	0
59	0	0	0.55	1	0	1
60	0	0.5	0.59	1	1	1
61	0	0	0.11	0	1	
62	0	0.5	0.62	1	0	1
63	0	0	0.55	0	0	0
64	0	0	0.52	0	0	
65	0	0	0.31	0	0	0
66	0	0	0.44	0	0	1
67	1	0	0.65	0	1	1
68	0	0.5	0.54	0	1	1
69	0	0	0.76	1	0	
70	0	0	0.45	1	1	1
71	0	0	0.62	1	1	1
72	0	0	0.59	1	0	
73	1	1	0.49	1	0	0
74	1	0	0.54	0	1	0
75	0	0	0.33	1	0	0
76	0	0	0.79	0	1	
77	1	0	0.59	1	0	1
78	0	0.5	0.51	1	1	1
79	0	0	0.68	0	0	0

Table C3c: Continued

80	0	1	0.26	1	1	0
81	0	0	0.51	0	1	1
82	0	0	0.21	0	0	1
83	1	0.5	0.76	1	1	1
84	0	0	0.44	1	0	1
85	0	0	0.87	1	0	1
86	0	0.5	0.44	0	0	0
87		0	0.06	1	0	
88	0	0.5	0.11	0	0	
89	0	0	0.66	1	0	1
90	0	0.5	0.27	0	1	
91	0	0	0.62	1	1	1
92	0	0	0.60	1	0	
93	0	0	0.42	1	0	1
94	0	0.5	0.41	0	0	
95	1	0.5	0.25	0	0	
96	1	0	0.64	0	0	0
97	1	0	0.64	1	0	1
98	0	0.5	0.28	0	1	
99	1	0	0.46	1	1	0
100	0	0	0.54	1	1	0
101	0	0	0.61	1	1	1
102	0	0.5	0.54	1	1	
103	0	0	0.58	1	1	1
104	0	0.5	0.69	0	0	0
105		0.5	0.40	0	1	
106	0	0.5	0.34	0	1	
107	0	0.5	0.42	0	0	
108	0	0	0.62	1	0	0
109	0	0	0.46	0	1	
110	0	1	0.54	1	1	0
111	1	0.5	0.58	1	1	
112	0	0	0.53	1	0	0
113	0	0	0.39	0	0	
114	1	0	0.21	0	1	0
115	1	0	0.66	1	0	1
116	0	0.5	0.55	1	0	
117	0	0	0.54	0	0	0
118	0	0	0.72	1	0	1
119	0	1	0.26	1	0	
120	0	1	0.45	0	1	
121	0	0	0.60	1	1	1

Table C3c: Continued

122	1	0	0.36	1	1	1
123	0	0	0.31	0	1	0
124	0	0	0.64	1	0	0
125		0.5	0.45	1	1	0
126		0	0.46	1	1	1
127	0	0	0.35	0	1	0
128	1	0	0.54	1	0	1
129	0	0	0.32	1	0	1
130	0	0	0.26	0	1	0
131	0	0.5	0.62	1	1	1
132	0	0	0.54	0	0	0
133	0	0	0.45	1	0	1
134	0	0	0.29	1	0	1
135	0	0.5	0.36	0	1	
136	0	0.5	0.14	0	1	
137		0.5	0.15	1	1	
138	0	0.5	0.21	0	1	
139	0	0	0.31	0	0	
140	0	0	0.88	1	1	1
141	0	0	0.60	1	0	1
142	0	0	0.71	0	1	1
143	0	0	0.91	1	1	1
144	1	0	0.78	0	1	1
145	0	0	0.54	1	1	0
146		0.5	0.40	1	0	0
147	0	0	0.59	1	0	0
148	0	0	0.58	1	1	1
149	0	0.5	0.53	1	1	1
150	0	1	0.58	1	0	0
151	0	0	0.62	0	0	1
152	0	0	0.31	1	0	
153	0	0	0.74	1	0	1
154	0	0	0.48	0	0	0
155	0	0.5	0.51	0	1	1
156	0	0	0.75	0	1	0
157	0	0	0.59	0	1	
158		0	0.56	1	1	1
159	0	0.5	0.40	0	0	0

Table C4: Truth Table
State Activity Changes All Years

State	Activity Change	FTE	Special	Coronary Death Rate	Central	Per Capita Expend
1	0	1	0.62	0	0.5	1
2	0	0	0.37	0	0.5	1
3	0	1	0.36	0	0	0
4	0	1	0.51	1	1	1
5	0	1	0.37	0	0	0
6	0	1	0.49	0	0	0
7	0	0	0.41	0	0	1
8	0	0	0.41	1	0	1
9	0	1	0.67	1	1	
10	0	0	0.36	0	0	0
11	0	1	0.52	0	.	1
12	0	0	0.24	0	0	0
13	0	1	0.28	0	0	0
14	0	0	0.47	1	0	0
15	0	0	0.35	1	0	1
16	0	0	0.36	0	0	0
17	0	0	0.29	1	0	0
18	1	0	0.60	1	0.5	
19	0	0	0.39	0	0.5	1
20	0	1	0.21	1	0	0
21	0	1	0.78	0	0	1
22		0	0.28	1	0	0
23	0	1	0.38	0	0	1
24	0	1	0.53	1	1	1
25	0	1	0.35	1	0	0
26	1	0	0.32	0	0	1
27	0	0	0.43	0	0	1
28	0	0	0.15	0	0.5	0
29	0	0	0.34	1	0	1
30	1	1	0.57	1	0.5	
31	1	1	0.48	1	0	1
32	0	1	0.34	0	0	0
33	0	0	0.47	0	0	1
34	0	0	0.31	1	0	0
35	0	1	0.58	1	0.5	1
36	0	0	0.37	0	0	0
37	0	1	0.38	1	0.5	1
38	1	0	0.58	1	.	1
39	0	1	0.51	1	1	0

Table C4: Continued

40	1	0	0.42	1	0.5	1
41	1	1	0.59	1	0.5	0
42	0	1	0.50	1	0.5	1
43	1	0	0.37	0	0	
44	0	0	0.43	1	1	1
45	0	1	0.55	0	0.5	0
46	0	1	0.43	0	0	0
47	0	0	0.39	1	0	1
48	0	0	0.23	0	0	0
49	0	1	0.25	0	0	0

Table C4a: Truth Table
State Activity Changes 2008 to 2010

State	Activity Change	FTE	Central	Coronary Death Rate	Special	Per Capita
1	0	1	0.5	0	0.57	1
2	0	0	0.5	0	0.42	1
3	0	1	0	1	0.42	1
4	0	1	1	1	0.54	1
5	0	1	0	1	0.38	0
6		0	0	0	0.54	1
7	0	0	0	0	0.46	0
8		0	0	1	0.59	1
9	0	1	1	1	0.52	1
10	0	0	0	0	0.40	0
11		1		0	0.51	1
12	0	0	0	0	0.34	0
13	0		0	1	0.27	0
14	0	0	0	1	0.39	0
15	0	0	0	1	0.36	0
16	0	0	0	0	0.43	0
17	0	0	0	1	0.29	1
18	1	1	0.5	1	0.66	0
19	0	0	0.5	0	0.35	0
20		1	0	1	0.43	1
21	0	1	0	0	0.80	1
22	0	0	0	1	0.30	0
23	0	1	0	0	0.46	1
24	0	1	1	1	0.65	1
25	0	1	0	1	0.36	0
26	0	0	0	0	0.45	0
27	0	0	0	0	0.57	1
28	0		0.5	0	0.46	0
29	0	0	0.5	0	0.43	0
30	0	1	0	1	0.37	0
31	0	1	0.5	0	0.44	1
32	0	1	0	1	0.48	0
33		1	0	1	0.36	0
34	0	0	0	0	0.46	1
35	0	0	0	1	0.39	1
36	0	1	0.5	1	0.40	1

Table C4a: Continued

37	0	0	0	1	0.36	0
38	0	1	0.5	0	0.32	0
39	1	0		1	0.73	0
40	0	1	1	0	0.57	1
41		0	0.5	1	0.37	0
42	1	1	0.5	1	0.38	0
43		1	0.5	1	0.55	1
44	0	0	0	0	0.54	1
45	0	0	1	0	0.60	0
46	0	1	0.5	0	0.45	1
47	0	1	0	0	0.46	1
48	0	0	0	1	0.56	0
49	0	0	0	0	0.49	0
50		1	0	0	0.44	0

Table C4b: Truth Table
State Activity Changes 2010 to 2013

State	Change	Special	Coronary Death rate	FTE	Per Capita	Central
1	0	0.59	0	1	1	0.5
2	0	0.35	0	0	1	0.5
3	0	0.47	1	1	0	0
4	0	0.45	1	1	1	1
5	0	0.29	1	1	1	0
6	0	0.43	0	1	0	0
7	0	0.40	0	0	0	0
8	0	0.38	1	0	1	0
9	0	0.61	1	1	1	1
10	0	0.37	0	0	0	0
11	0	0.53	0	1	1	.
12	0	0.36	0	0	0	0
13	0	0.36	1	0	0	0
14	0	0.45	1	0	0	0
15	0	0.33	1	0	0	0
16	0	0.39	0	0	0	0
17	0	0.25	1	0	1	0
18	1	0.54	1	1	0	0.5
19	0	0.38	0	0	1	0.5
20	0	0.32	1	1	0	0
21	0	0.75	0	1	1	0
22	0	0.25	1	0	1	0
23	0	0.36	0	1	1	0
24	0	0.63	1	1	1	1
25	0	0.34	1	1	0	0
26	1	0.39	0	0	0	0
27	0	0.37	0	0	1	0
28	0	0.37	0	0	0	0.5
29	0	0.37	1	1	1	0
30	0	0.36	0	1	0	0.5
31	0	0.43	1	1	1	0
32	0	0.40	0	1	0	.
33	0	0.45	0	0	1	0
34	0	0.29	1	0	0	0
35	0	0.52	1	1	1	0.5
36	0	0.38	0	0	0	0
37	0	0.32	1	1	0	0.5
38	1	0.59	1	0	1	.

Table C4b: Continued

39	1	0.37	1	0	1	0.5
40	1	0.54	1	1	1	0.5
41	0	0.49	1	1	1	0.5
42	1	0.41	0	0	0	0
43	0	0.40	0	0	1	1
44	0	0.59	0	1	0	0.5
45	0	0.33	0	1	0	0
46	0	0.37	1	0	1	0
47	0	0.33	0	0	0	0
48	0	0.41	0	1	0	0

Table C4c: Truth Table
State Activity Changes 2013 to 2016

State	Activity Change	FTE	Special	Coronary Death Rate	Central	Per Capita Expend
1	0	1	0.62	0	0.5	1
2	0	0	0.37	0	0.5	1
3	0	1	0.36	0	0	0
4	0	1	0.51	1	1	1
5	0	1	0.37	0	0	0
6	0	1	0.49	0	0	0
7	0	0	0.41	0	0	1
8	0	0	0.41	1	0	1
9	0	1	0.67	1	1	
10	0	0	0.36	0	0	0
11	0	1	0.52	0	.	1
12	0	0	0.24	0	0	0
13	0	1	0.28	0	0	0
14	0	0	0.47	1	0	0
15	0	0	0.35	1	0	1
16	0	0	0.36	0	0	0
17	0	0	0.29	1	0	0
18	0	0	0.60	1	0.5	
19	0	0	0.39	0	0.5	1
20	0	1	0.21	1	0	0
21	0	1	0.78	0	0	1
22	0	0	0.28	1	0	0
23	0	1	0.38	0	0	1
24	0	1	0.53	1	1	1
25	0	1	0.35	1	0	0
26	1	0	0.32	0	0	1
27	0	0	0.43	0	0	1
28	0	0	0.15	0	0.5	0
29	0	0	0.34	1	0	1
30	1	1	0.57	1	0.5	
31	0	1	0.48	1	0	1
32	0	1	0.34	0	0	0
33	0	0	0.47	0	0	1
34	0	0	0.31	1	0	0
35	0	1	0.58	1	0.5	1
36	0	0	0.37	0	0	0
37	0	1	0.38	1	0.5	1
38	0	0	0.58	1	.	1

Table C4c: Continued

39	0	1	0.51	1	1	0
40	0	0	0.42	1	0.5	1
41	0	1	0.59	1	0.5	0
42	0	1	0.50	1	0.5	1
43	1	0	0.37	0	0	
44	0	0	0.43	1	1	1
45	0	1	0.55	0	0.5	0
46	0	1	0.43	0	0	0
47	0	0	0.39	1	0	1
48	0	0	0.23	0	0	0
49	0	1	0.25	0	0	0

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